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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,627,783 ('783 Patent)
1002	File History of the '783 Patent
1003	Declaration of Professor R. James Duckworth, Ph.D.
1004	*Curriculum Vitae* of Professor R. James Duckworth, Ph.D.
1005	PCT Publication No. WO 2005/092182 A1 ("Kotanagi")
1006	U.S. Patent No. 6,265,789 ("Honda")
1007	U.S. Publication No. 2001/0056243 ("Ohsaki")
1008	PCT Publication No. WO 2012/140559 Al ("Shmueli")
1009	European Patent App. No. EP14163114 ("Coppola")
1010	U.S. Provisional Patent App. No. 61/976,388 ("Fei")
1011	Reserved
1012	U.S. Publication No. 20150214749 A1 ("Park")
1013	Reserved
1014	U.S. Publication No. US 20120221254 A1 (Kateraas)
1015	U.S. Provisional Patent Application No. 61/932258 ("Park Provisional")
1016	U.S. Publication No. US 20140135594 ("Yuen")
1017	PCT Publication No. WO 2015116111 A1 ("Jabori")
1018–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola PCT")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")

Exhibit No.	Description
1023–1024	Reserved
1025	U.S. Patent No. 4,163,447 ("Orr")
1026	U.S. Patent No. 4,224,948 ("Cramer")
1027	U.S. Patent No. 4,248,244 ("Charnitski")
1028	PCT Publication No. WO 1982000088 A1 ("Steuer")
1029	U.S. Patent No. 4,375,219 ("Schmid")
1030	U.S. Patent No. 5,316,008 ("Suga")
1031	U.S. Patent No. 5,738,104 ("Lo")
1032	Reserved
1033	U.S. Publication No. 20050116820 A1 ("Goldreich")
1034	U.S. Publication No. 20070276270 A1 ("Tran")
1035	U.S. Publication No. 20080208009 A1 ("Shklarski")
1036	U.S. Patent No. 6,091,530 ("Duckworth")
1037	U.S. Patent 6,075,755 ("Zarchan")
1038	Y. Mendelson, "A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring," Proceedings of the 28th IEEE (2006)
1039	Y. Mendelson, "Wearable Wireless Pulse Oximetry for Physiological Monitoring," PPL Workshop (2008)
1040	Reserved
1041	U.S. Publication No. 20150355604 A1 ("Fraser")
1042	J. Shackelford and R. Doremus, "Ceramic and Glass Materials Structure, Properties and Processing" (2008) – Excerpt
1043	F. Shi, "Ceramic Materials – Progress In Modern Ceramics" (2012) – Excerpt
1044	R. Loehman, "Characterization of Ceramics" (1993) – Excerpt

Exhibit No.	Description
1045	F. Aldinger and V. Weberruss, "Advanced Ceramics and Future Materials: An Introduction to Structures, Properties, Technologies, Methods" (2010) – Excerpt
1046	W.D. Kingery et al., "Introduction to Ceramics: Second Edition" (1960) – Excerpt
1047	USPTO Memo of April 5, 2018 regarding *Dynamic Drinkware* and *Amgen* cases
1048	District of Delaware Statistics, downloaded on February 21, 2023 from https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0930.2022.pdf
1049	Declaration of Sylvia D. Hall-Ellis, Ph.D.

CLAIM LISTING

Limitation	Claim Language
1a	An electronic device, comprising: a housing defining a first opening opposite to a second opening; a band attached to the housing and configured to secure the electronic device to a user;
1b	a display positioned in the first opening;
1c	a ceramic cover disposed over the second opening and forming a portion of an exterior surface of the electronic device;
1d	a biosensor module disposed within the second opening below the ceramic cover; and
1e	a wireless charging receive coil aligned with the second opening and below the ceramic cover;
1f	wherein: the ceramic cover is configured to pass optical signals generated by the biosensor module; and
1g	the ceramic cover is configured to pass wireless power from an external wireless charging device to the wireless charging receive coil.
2	The electronic device of claim 1, wherein the biosensor module comprises: a light source configured to emit light toward a region of skin of the user; and a detector configured to receive light reflected from the region of skin.
3	The electronic device of claim 2, wherein: the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin.

Limitation	Claim Language
4	The electronic device of claim 2, wherein: the light source and the detector are configured to measure changes in light absorption by the region of skin; the electronic device is configured to compute a health metric using the measured change in light absorption; and the display is configured to display information associated with the health metric.
5	The electronic device of claim 2, wherein the light source and the detectors are configured to operate as a photoplethysmogram (PPG) sensor.
6	The electronic device of claim 1, wherein: the ceramic cover is a disk having a disk diameter that is greater than an opening diameter of the second opening; and the ceramic cover forms a water-tight seal with the housing along a perimeter of the ceramic cover.
7	The electronic device of claim 1, wherein: the second opening has an opening diameter; the wireless charging receive coil has a coil diameter that is less than the opening diameter; and the wireless charging receive coil is configured to receive the wireless power through the second opening.
8	The electronic device of claim 1, wherein: the ceramic cover has a convex contoured shape that protrudes toward the user; and the convex contoured shape facilitates alignment between the ceramic cover and a mating surface of the external wireless charging device.
9a	A wearable electronic device, comprising: a housing comprising a bottom portion defining an opening;
9b	a biosensor module aligned with the opening;

Limitation	Claim Language
9c	a wireless charging receive coil positioned within the housing and aligned with the opening;
9d	a battery operably coupled to the wireless charging receive coil; and
9e	a cover disposed over the biosensor module; wherein: the cover is configured to pass optical signals to and from the biosensor module; and
9f	the cover is configured to pass wireless power to the wireless charging receive coil.
10	The wearable electronic device of claim 9, wherein: the housing is formed from a metal material; and the cover is formed from a non-metal material.
11	The wearable electronic device of claim 9, wherein: the wireless charging receive coil has a coil diameter that is less than a diameter of the biosensor module; and the wireless charging receive coil is configured to receive the wireless power through the biosensor module.
12	The wearable electronic device of claim 9, wherein: the cover is a disk having a convex shape that protrudes away from the housing; and the convex shape is configured to facilitate alignment with a concave surface of an external inductive power transmitter dock.
13	The wearable electronic device of claim 12, wherein: the wearable electronic device is magnetically coupled to the external inductive power transmitter dock through the cover and the biosensor module.
14	The wearable electronic device of claim 9, wherein: the biosensor module includes an array of optical components; and the cover includes an array of windows, each window aligned with a corresponding optical component of the array of optical components.

Limitation	Claim Language
15a	An electronic watch, comprising:
15b	a housing defining an interior cavity and a bottom portion having an opening;
15c	a band attached to the housing and configured to secure the electronic watch to a user;
15d	a biosensor module positioned along the bottom portion of the housing and configured to transmit optical signals and receive reflected optical signals through the opening of the housing; and
15e	a wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing.
16	The electronic watch of claim 15, wherein: the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; and the electronic watch is configured to magnetically couple with the external inductive power transmitter dock.
17	The electronic watch of claim 15, wherein: the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; the electronic watch defines a convex contoured surface along the bottom portion; and the convex contoured surface is configured to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock.
18	The electronic watch of claim 17, wherein the convex contoured surface is configured to protrude toward a portion of skin of the user when the electronic watch is worn.

Limitation	Claim Language
19	The electronic watch of claim 15, wherein: the electronic watch is configured to compute a health metric using the biosensor module; and the health metric is one or more of: a heart rate, a respiration rate, a blood oxygenation level, a blood volume estimate, or blood pressure.
20	The electronic watch of claim 19, wherein: the electronic watch includes a display; and the display is configured to display information associated with the health metric.

Grounds Listing

GROUND 1	Claims 9–11, 15, 19, and 20 are unpatentable as obvious in view of Kotanagi and Honda
GROUND 2	Claim 16 is unpatentable as obvious in view of Kotanagi and Honda, and optionally in further combination with Park
GROUND 3	Claims 1–7 and 14 are unpatentable as obvious in view of Kotanagi and Honda, and optionally in further combination with Kateraas
GROUND 4	Claims 12–13 and 17–18 are unpatentable as obvious in view of Kotanagi and Honda, Jabori, and optionally in further combination with Park
GROUND 5	Claims 3 and 14 are unpatentable as obvious in view of Kotanagi, Honda, Fraser, and optionally in further combination with Kateraas
GROUND 6	Claim 8 is unpatentable because it would have been obvious in view of Kotanagi and Honda, Jabori, and optionally in further combination with Kateraas and/or Park

Masimo Corporation ("Petitioner" or "Masimo") requests *inter partes* review of Claims 1–20 of U.S. Patent No. 10,627,783 ("the '783 Patent").

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is the real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the '783 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN ("the Delaware Litigation").

3. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	**Back-up Counsel**
Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson, & Bear, LLP 2pmn@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Jarom D. Kesler (Reg. No. 57,046) Knobbe, Martens, Olson, & Bear, LLP 2jzk@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson, & Bear, LLP 2tmc@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 64,735 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to MasimoIPR-783@knobbe.com.

B. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

C. Grounds for Standing (37 C.F.R. § 42.104(A))

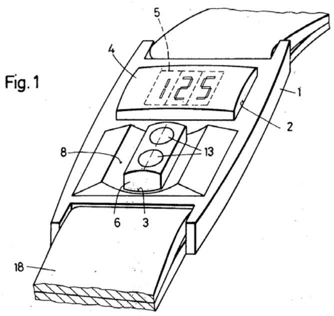
Petitioner hereby certifies that the '783 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

Wearable electronic devices have taken the form of smart watches for decades, and these have long included health monitoring features. When Apple released its first smart watches in 2015, the company joined a long tradition. The chart[1] below shows some biosensor smartwatch patent figures through the decades:

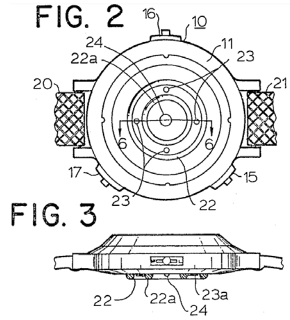
[1] These references are discussed further in EX1003 ¶¶65–100.

1978



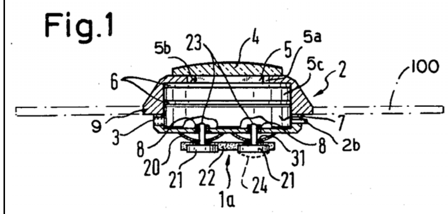
EX1022

1980



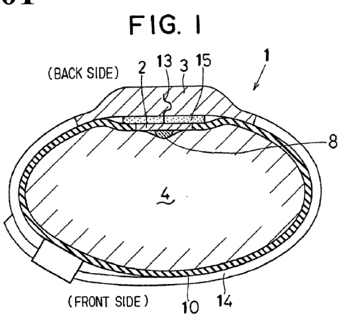
EX1026

1983



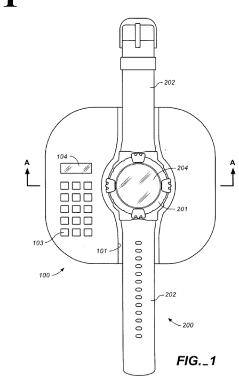
EX1029

2001



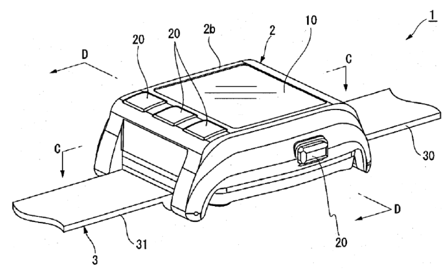
EX1007

2001



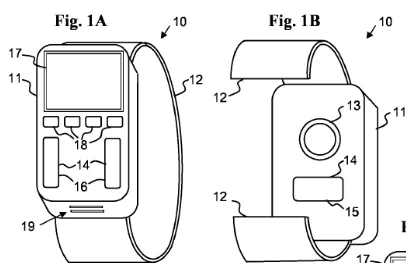
EX1006

2005



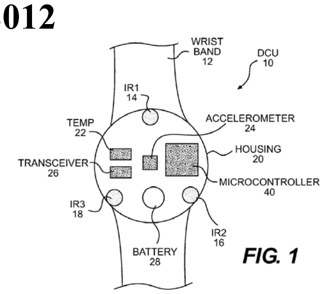
EX1005

2012



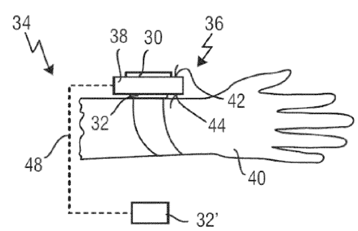
EX1008

2012



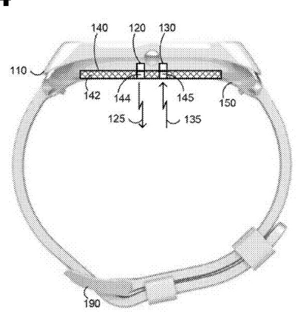
EX1014

2014



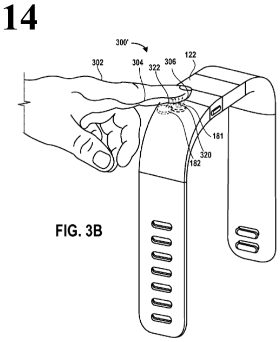
EX1020

2014



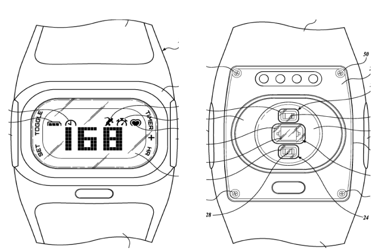
EX1041

2014



EX1016

2014



EX1010

Not all of these references are used as a substantive basis for this petition. However, the figures above (and the overview of developments in earlier decades, EX1003 ¶¶65–100, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

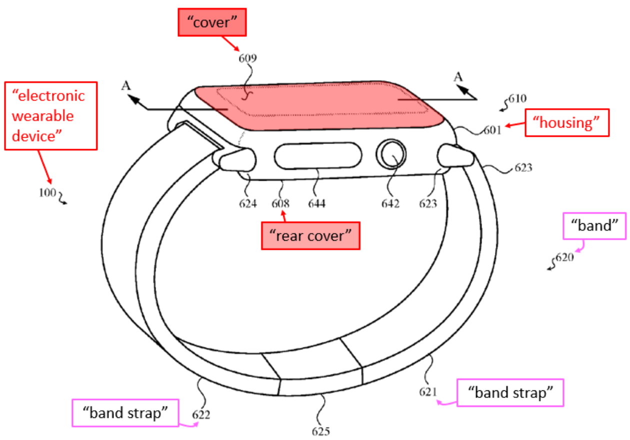
As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art ("POSITA") at the time of invention. Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶1–301.[2]

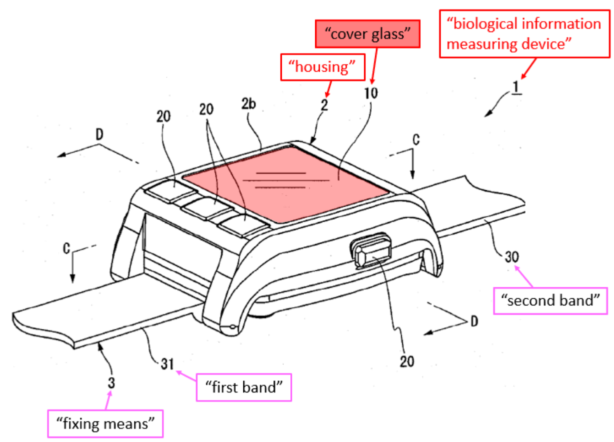
B. Overview of the '783 Patent

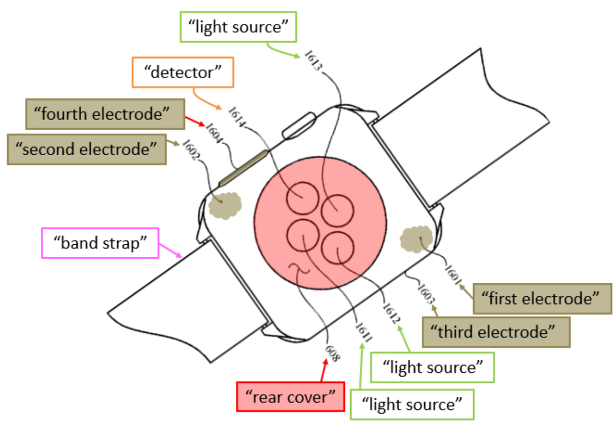
Apple's '783 patent purports to claim novel improvements to health-monitoring smart watches, but the Challenged Claims merely recite features that were well known prior to the '783 Patent, and their combinations in the claims provide no unexpected results or benefits. The following compares '783 Patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

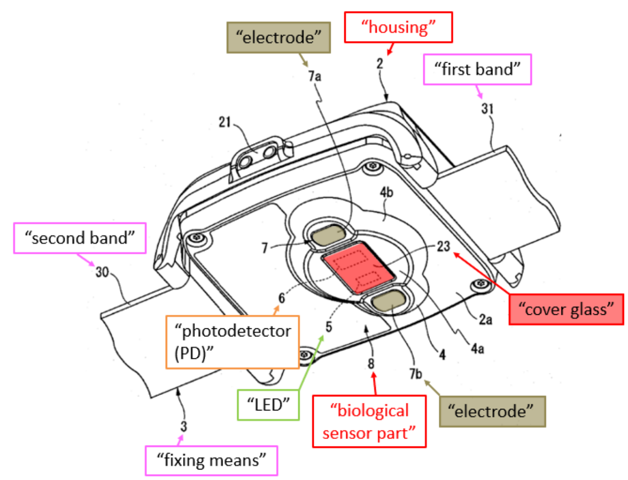
[2] In general, herein, a single citation to Dr. Duckworth's expert declaration is provided at the end of each paragraph that is supported by Dr. Duckworth's testimony.

<u>'783 Patent</u>	<u>Prior Art - Kotanagi</u>









See[3] EX1001 at 12, 22 (Figs. 6 and 16); *see* EX1005 at 25–26 (Figs. 4 and 5).

C. Prosecution History of the '783 Patent

The Examiner rejected Claims 1–34 on June 15, 2018. EX1002 at 1476–1504. Applicant proposed adding "structural features" for "wireless charging,"

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[3] In this petition, color feature labels and color shadings are added for convenience and do not come from the cited patent drawings themselves.

including a "ceramic cover" "to overcome the prior art of record." *Id*. at 1269. Applicant then presented wholly new Claims 35–54. *Id*. at 1275–78. These were allowed on December 19, 2018. *Id*. at 1005–1010. The reason: "the prior art fails to teach or suggest the specific arrangement and configuration of the claimed cover, opening in the housing, and wireless charging coil." *Id*. at 387.

None of the prior art references that Petitioner relies on in this Petition were considered by the examiner during prosecution. *See generally* EX1002. EX1003 ¶¶62–63.

D. Priority

The '783 patent, filed September 10, 2016, is a continuation of U.S. Application No. 14/842,617, filed September 1, 2015, which claims priority to provisional application 62/044,974, filed September 2, 2014—the earliest alleged priority date. EX1002 at 186, 1965. EX1003 ¶64.

E. Level of Ordinary Skill in the Art

A POSITA of the '783 patent would have had at least a bachelor's degree in a discipline related to electrical engineering, mechanical engineering, physics, industrial design, or equivalent, and at least three years of experience working with or developing electronic medical or consumer devices. EX1003 ¶¶39–42.

F. Claim Construction

Numerous claim terms are construed based on their ordinary meanings or otherwise in the context of the invalidity analysis in this petition, consistent with *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Constructions of a few example terms and phrases are also discussed here for convenience.

1. "a ceramic cover"

Claim 1 recites "a ceramic cover" over the second (or rear) opening. A POSITA would have understood "ceramic" in this context to mean a solid, nonmetallic, inorganic material such as glass or sapphire. Glass is included because it is "usually considered a subset of ceramics" (EX1044 at 11; *see* EX1045 at 12) and the '783 patent explains that "cover glass" is a term of art and is often used generically, "regardless of the material." EX1001 21:56–59. Sapphire is included because Sapphire (formed of alumina) is a well-known structural ceramic (EX1042 at 8, 10; EX1049 ¶¶ 34–40 (establishing public accessibility)) and the '783 patent description specifies that its rear cover may be a sapphire sheet, zirconia, or alumina material. *See* EX1001 21:59–60; 26:16–19.[4] Thus prior art having a rear cover of glass or sapphire or any other ceramic material satisfies this limitation. EX1003 ¶¶45–49.

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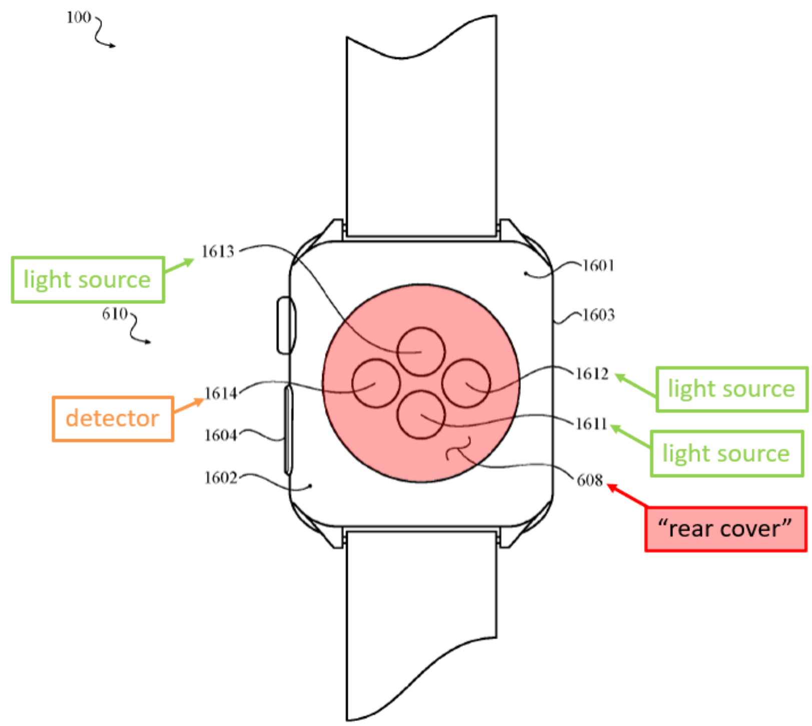
[4] Citations herein containing a colon (":") are to columns and lines, where available, or to pages and lines, where lines are numbered.

2. "biosensor module"

Claims 1, 9, 11, 13–15, and 19 refer to a "biosensor module," a portion of the device that includes one or more sensors (e.g., the lights and detector of Fig. 16 in the '783 patent).



See EX1001 at 22 (Fig. 16). The '783 patent states the in some embodiments, the biosensor module "includes the rear cover 608." *Id*. 28:9–10; *id*. at 13. Biosensors can be: "disposed relative to or attached to a rear cover 608 that is formed from an optically transparent material and is configured to be positioned with the opening of the housing 601." *Id.* 40:47–48. Accordingly, a "biosensor module" is a portion of the device that includes one or more sensors and optionally includes a cover. EX1003 ¶¶50–53.

3. "ceramic cover defines a [first/second] opening to [transmit/receive] the light"

The "first opening" and "second opening" limitations of Claim 3 are different from the "first opening" and "second opening" of Claim 1. Claim 1 recites a first opening in the housing, where the display is positioned, and a second opening opposite to the first. EX1001 58:3. Claim 1 states that a ceramic cover is disposed over "the second opening" (making it a rear cover), and Claim 3 states that this rear cover "defines" its own, ***separate*** "first opening" and "second opening." *Id*. 58:29–31.

The '783 patent describes the rear cover this way:

> The device 100 may also include a **rear cover 608** located on the rear-facing surface of the housing 601 of the device body 610. . . . [T]he rear cover 608 may be formed from **a sapphire sheet**, zirconia, or alumina material . . . . . The convex curved area of the rear cover 608 may include one or more windows or apertures that provide **operational access** to one or more **internal components** located within the housing. For example, the rear cover 608 may include an array of windows, each window including an aperture or opening **for a respective light source** 1611–1613 and/or the detector 1614.

Id. 26:12–19 (emphases added); *id*. 40:46–67. EX1003 ¶54–55.

Accordingly, the ’783 patent describes a single sheet of material positioned within a single opening in a housing. This sheet “defines” one or more windows or apertures, where sensors are positioned behind that sheet. EX10001 40:46–67.

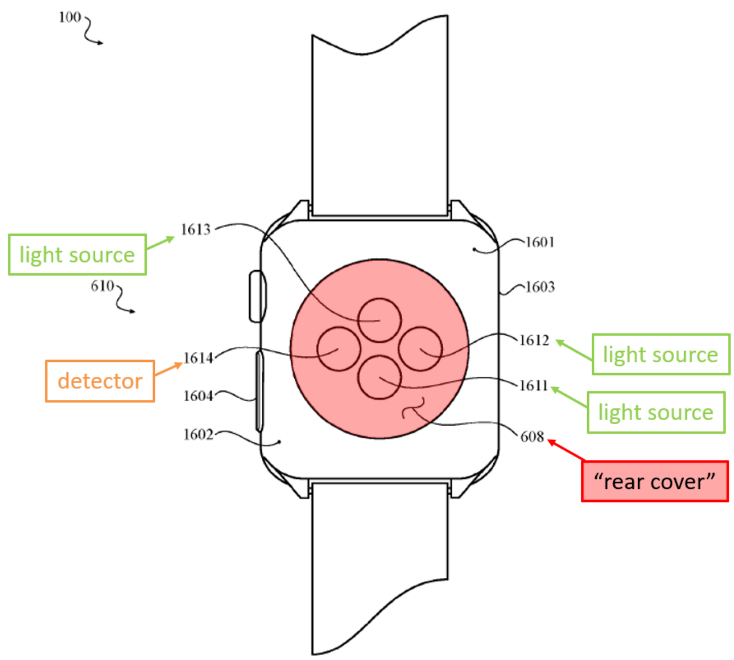


FIG. 16

See id. at 22 (Fig. 16). The rear cover defines these openings by allowing light to pass through for operational access to the internal optical components. In the ’783 patent, the single rear cover 608 defines multiple openings by allowing passage of light through the cover at the round locations labeled 1611–1614 in Fig. 16. EX1003 ¶56. Thus, “ceramic cover defines a [first/second] opening to [transmit/receive] the light” should be construed as “ceramic cover that includes [first/second] locations that allow the passage of light.” EX1003 ¶56.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Petitioner requests that the Board cancel claims 1–20 of the '783 Patent under post-AIA 35 U.S.C. § 103 because they would have been obvious before their effective filing date to a POSITA.

B. Status of References as Prior Art

The references relied upon in the grounds herein are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'783 patent (background section)	Admitted Prior Art
1005	Kotanagi	Post-AIA 35 U.S.C. §102(a)(1) – published October 6, 2005
1006	Honda	Post-AIA 35 U.S.C. §102(a)(1) – issued July 24, 2001
1012	Park	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed January 28, 2014 (see EX1015)
1014	Kateraas	Post-AIA 35 U.S.C. §102(a)(1) – published August 30, 2012
1016	Yuen	Post-AIA 35 U.S.C. §102(a)(1) – published May 15, 2014
1017	Jabori	Post-AIA 35 U.S.C. §102(a)(2) – filed January 30, 2014

Exhibit No.	Description	Prior Art Basis
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – filed August 19, 2014

These references constitute analogous art because they are from the same field of endeavor as the ’783 patent, e.g., watches and wearable electronic devices. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, e.g., wireless charging of biosensing watches. The volume and character of the overlapping features between the references listed above and the subject patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the side-by-side figures in the section above titled “Overview of the ’783 Patent” show many similarities between the patent and the Kotanagi reference. These figures and similar figures throughout this document support the obviousness combinations generally and also support the conclusion that these references are analogous art. Accordingly, a POSITA is presumed to have been aware of these references. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988). As set forth in detail below in the context of the invalidity analysis, a POSITA would have been motivated to combine these references prior to the filing of the ’783 patent for many additional reasons. EX1003 ¶¶107–108.

a. Park 35 U.S.C. § 102(a)(2) Analysis

Park (EX1012) was published July 30, 2015 and is prior art under post-AIA 35 U.S.C. § 102(a)(2) because it claims priority to U.S. provisional 61/932,258 ("Park Provisional" EX1015) filed January 28, 2014, which is before September 2, 2014, the earliest effective filing date of the '783 patent. EX1012 at 1.

The Park Provisional provides the same relevant disclosure as Park, as shown with the parallel citations to EX1012 and EX1015 herein. Figure sets in these exhibits are identical. EX1012 at 2–14; EX1015 at 41–52. The Park Provisional provides support[5] for at least Park's Claim 1. *See* EX1012 at 25; EX1015 at 7. EX1003 ¶113. Thus, Park is entitled to the Park Provisional's priority date of January 28, 2014. See EX1003 ¶114 for a claim chart

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[5] A showing that the Park Provisional supports one of Park's claims is not necessary under USPTO guidance indicating that *Dynamic Drinkware* does not apply to post-AIA cases. *See* EX1047 at 3. Nevertheless, Masimo makes such a showing out of an abundance of caution in view of Board cases applying *Dynamic Drinkware* to certain post-AIA cases. *See, e.g.*, *Mueller Sys., LLC v. Rein Tech, Inc.*, Case No. IPR2020-00100, 2020 WL 2478524, at *10 (PTAB May 12, 2020); *Epizyme, Inc. v. GlaxoSmithKline LLC*, Case No. IPR2020-01577, 2021 WL 841118, at *10–11 (PTAB Mar. 5, 2021).

demonstrating this correspondence.

b. Jabori 35 U.S.C. § 102(a)(2) Analysis

Jabori (EX1017) is a PCT publication designating the United States. 35 U.S.C. § 374. With an international filing date of January 30, 2014, it predates the earliest priority of the '783 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

c. Fraser 35 U.S.C. § 102(a)(2) Analysis

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the earliest priority of the '783 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

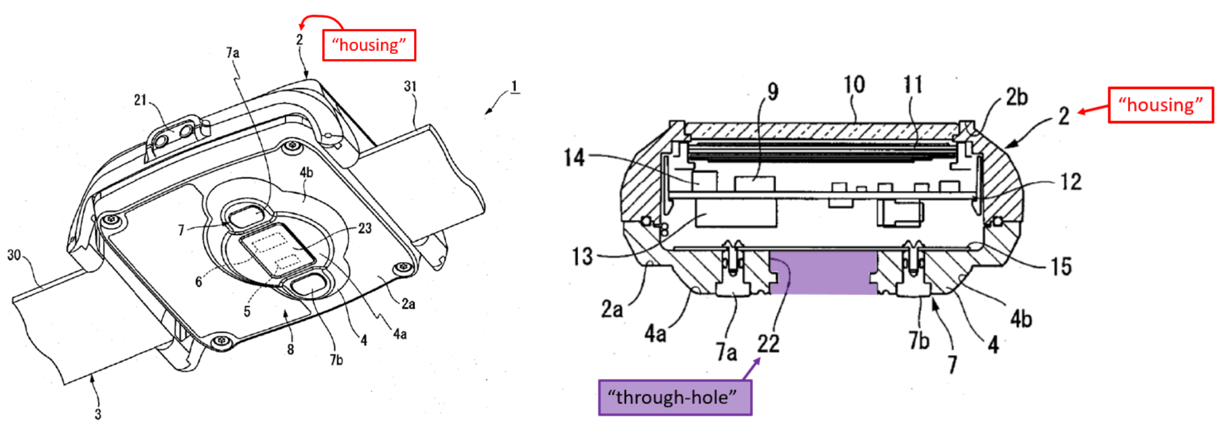
As explained below, claims 1–20 of the ’783 patent would have been obvious to a POSITA in view of the prior art at the relevant time. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond,* 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

A. Ground 1: Claims 9–11, 15, 19, and 20 are unpatentable because they would have been obvious in view of Kotanagi and Honda.

1. Independent Claim 9

a. “A wearable electronic device, comprising: a housing comprising a bottom portion defining an opening;”

Kotanagi teaches a housing with an opening in the bottom:



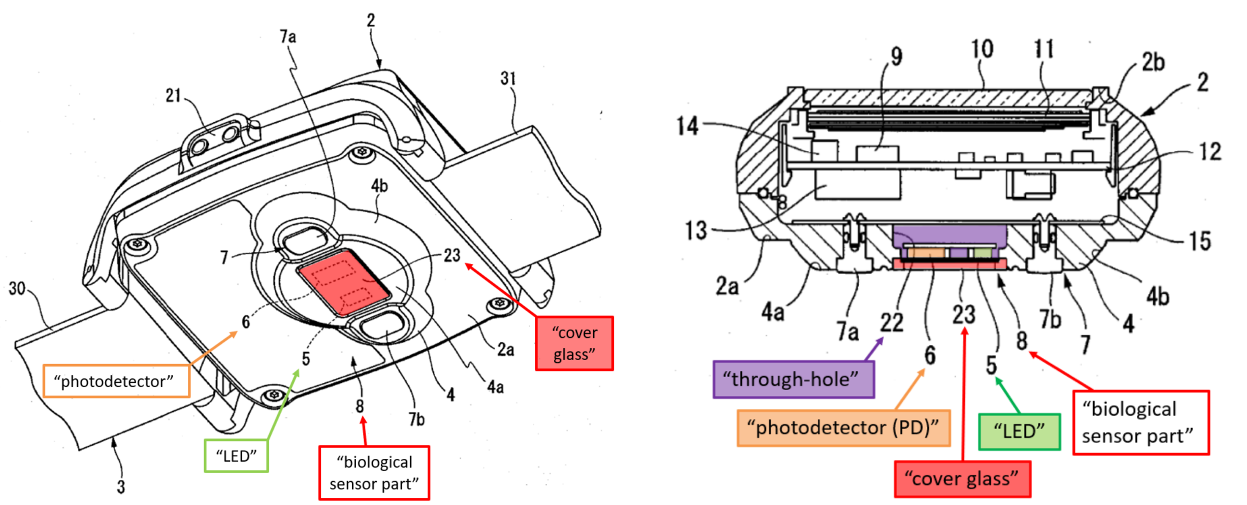
This biological information measuring device 1 includes a housing (main body) 2 . . . . [A] through-hole 22 passing through the outside and the inside of the housing 2 is formed in the center of the lower surface 4a of the protruding part 4 . . . .

See EX1005 at 26, 27 (Figs. 5, 7) (biosensor module removed); *id.* ¶¶45, 55.

EX1003 ¶116.

b. “a biosensor module aligned with the opening;”

Consistent with the construction of “biosensor module” in § II(F)(2) above, Kotanagi teaches a “biological sensor part” aligned with the opening:



See id. at 26, 27 (Figs. 5, 7). “The LED 5 and the PD 6 are disposed adjacent to one another ... so as to touch the inside of the glass cover 23.” EX1005 ¶(0055).

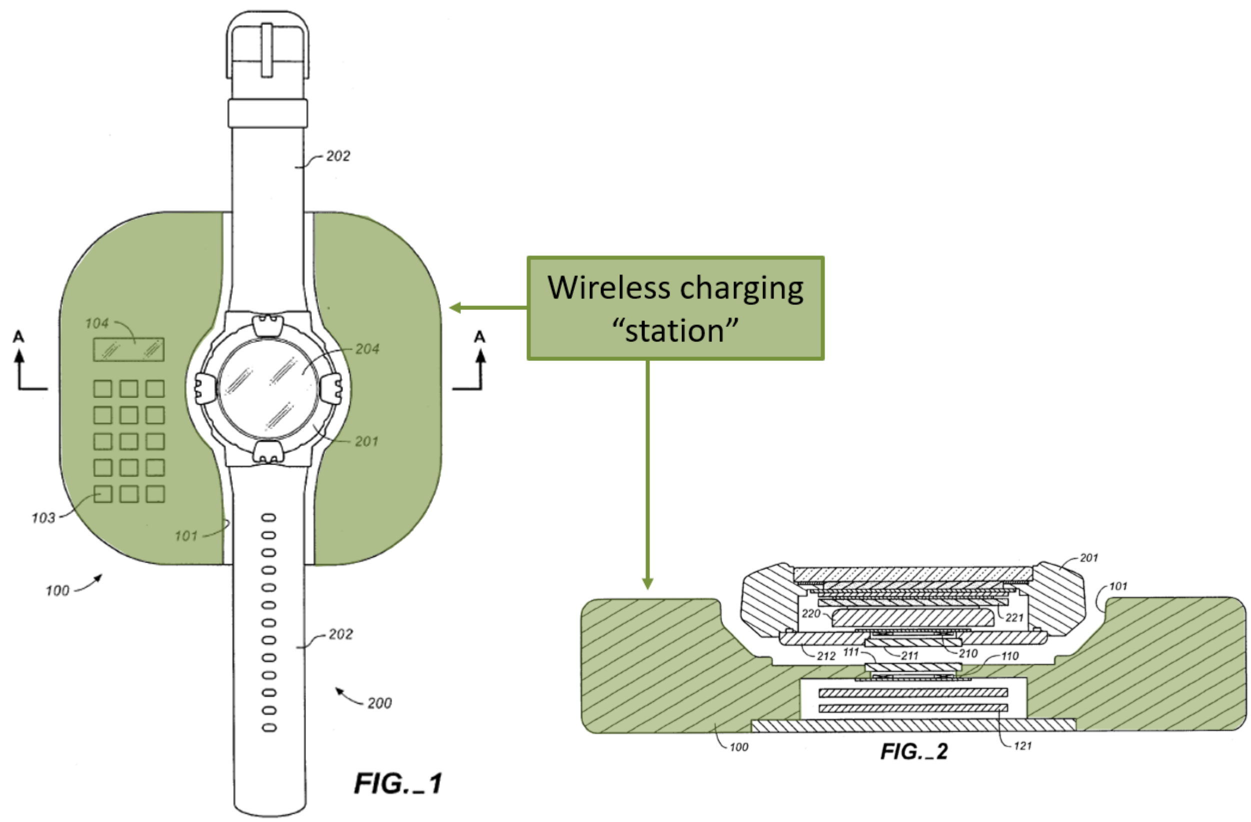
EX1003 ¶1117.

c. “a wireless charging receive coil positioned within the housing and aligned with the opening;”

Kotanagi teaches that “a transformer or the like for supplying power to a recharger and to the inside of the housing 2 may be provided ***so as to recharge the rechargeable battery 13 in a contactless state***.” EX1005 ¶(0053) (emphasis added). A POSITA would have known at the time of the ’783 Patent’s invention

that transformers use coils and that contactless charging uses a wireless charging receive coil. EX1003 ¶118.

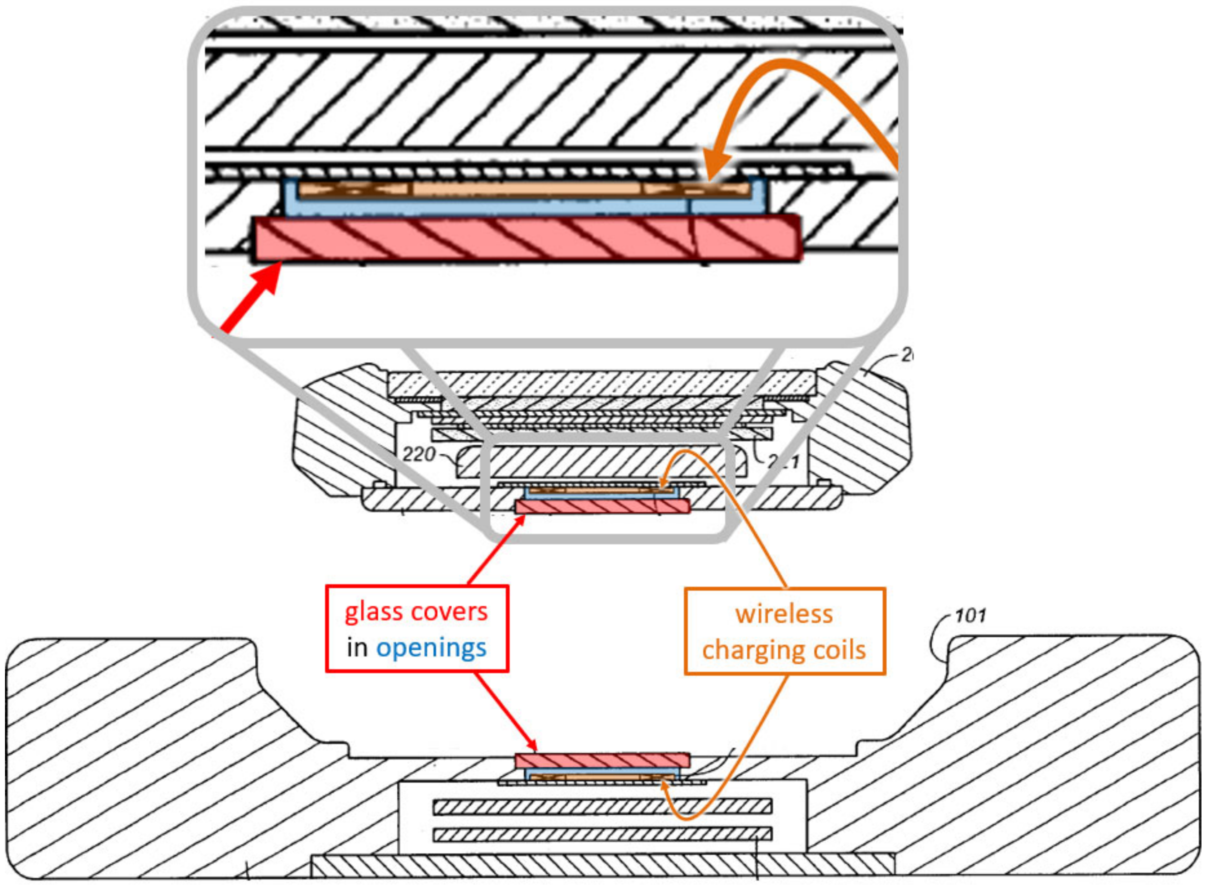
Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. EX1006 at 1. Honda's Figure 1 shows a plan view of a watch in a charging station, with Figure 2 showing a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2).

Kotanagi and Honda assignees share the same Seiko parent company. Like Kotanagi, Honda teaches a biosensor: "the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–

19. Like Kotanagi, the Honda watch has a cover glass that spans an opening in the bottom surface of the watch. Within its housing and behind its cover glass, Honda illustrates a "wireless charging receive coil" "aligned with the opening," as claimed:



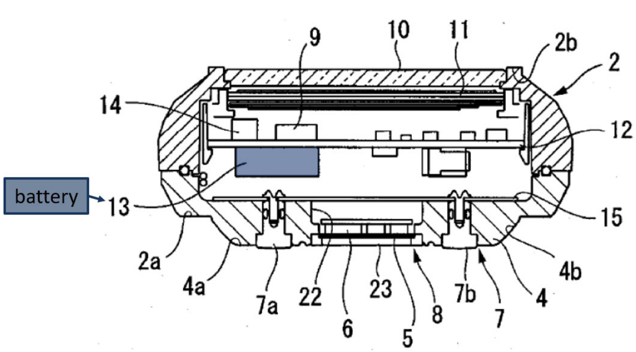
See EX1006 at 3 (Fig. 2).

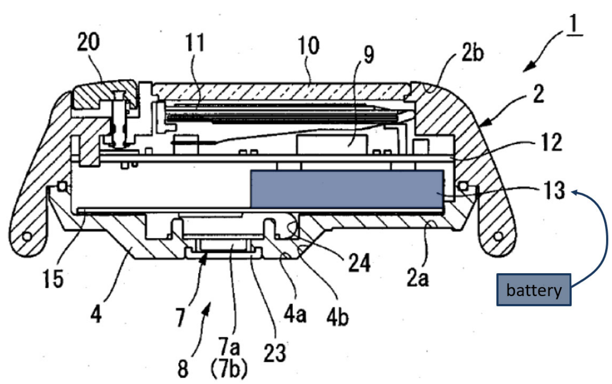
A person of ordinary skill in the relevant field or "art" at the time of the '783 patent (a "POSITA") would have been motivated to combine Honda and Kotanagi (e.g., to apply Honda's wireless charging teachings and structure to the Kotanagi device) based at least on Kotanagi's own statement that its rechargeable battery

can be recharged "in a contactless state." EX1005 ¶(0053). A POSITA seeking to charge this way would have looked to Honda—assigned to another subsidiary of the same Seiko parent company and providing compatible disclosure—to implement Kotanagi's stated goal. Honda's watch structure is similar in size and purpose to the watch of Kotanagi and Honda teaches incorporating a sensor for "pulse rate" or "heart rate". EX1006 6:17–19. Thus, a POSITA would have had a reasonable expectation of success in fitting Honda's wireless charging receive coil within Kotanagi's housing (e.g., in its "through-hole 22") for Kotanagi's expressed purpose of contactless recharging. EX1003 ¶121.

d. "a battery operably coupled to the wireless charging receive coil; and"

Kotanagi teaches a "rechargeable battery 13," which can be connected for "contactless," or wireless, charging. EX1005 ¶(0053). The battery is illustrated in the cross-sections of Kotanagi's Figures 6 and 7:





See EX1005 at 27 (Figs. 6, 7).

Honda specifically teaches a rechargeable battery coupled to a wireless charging coil: "The watch body 201 includes a circuit board 221, connected to a secondary battery 220 and a watch-side coil 210." EX1006 6:25–27.

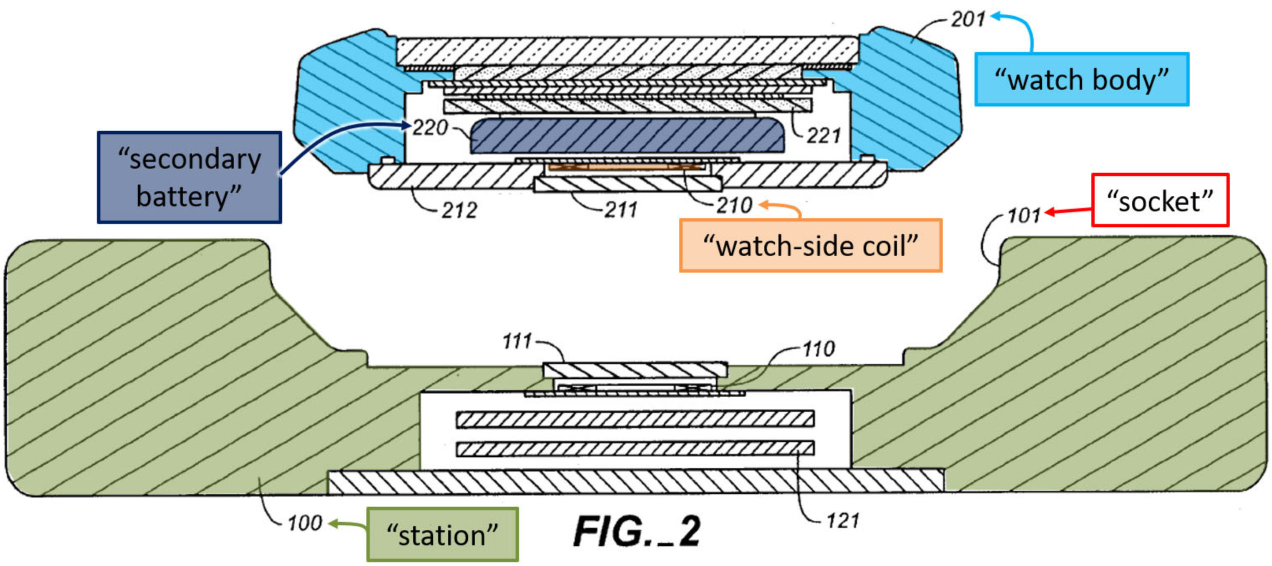


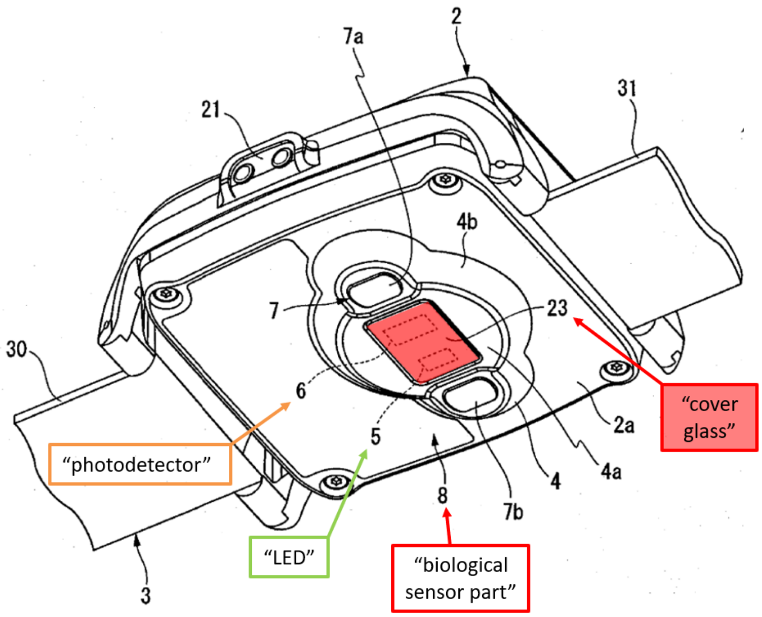
FIG._2

See id. at 3 (Fig. 2).

To obtain power, a POSITA would have included a coil in the Kotanagi device and connected it to Kotanagi's battery, as taught by Honda's battery connection from coil to battery. EX1003 ¶122–123.

e. "a cover disposed over the biosensor module; wherein: the cover is configured to pass optical signals to and from the biosensor module; and"

Kotanagi illustrates its photodetector 6 and LED 5 with dashed lines to indicate they lie behind the cover glass 23, forming a "biological sensor part" 8:



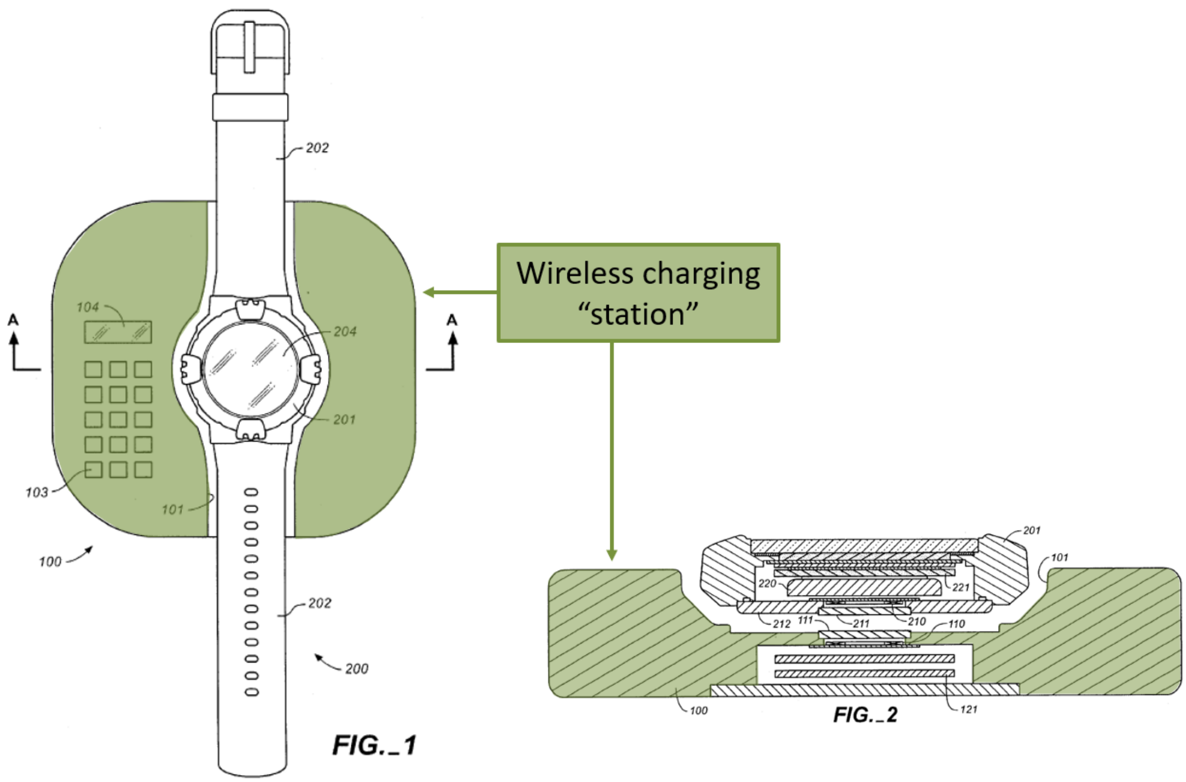
See EX1005 at 26 (Fig. 5). Kotanagi further explains:

> [T]he data processing part 9 **emits light from the LED 5** toward the living body. A portion of the emitted light is absorbed, for example, by hemoglobin in blood vessels, and another portion of the light is reflected by biological tissue. **The PD 6 receives this reflected light**, generates a pulse signal (biological information signal) corresponding to the amount of received light, and outputs the signal to the data processing part 9.

Id. ¶(0065) (emphases added). A POSITA would have understood from this context that because Kotanagi's "cover glass 23 is fixed to the housing 2 so as to block the through-hole 22" (EX1005 ¶(0055)), its LED and photodetector work by passing optical signals *through* the cover glass. Thus, Kotanagi's cover glass already passes optical signals to and from the LED and photodetector, satisfying this limitation. EX1003 ¶125–126.

f. **“the cover is configured to pass wireless power to the wireless charging receive coil.”**

As noted above, Kotanagi teaches recharging its battery “in a contactless state” (EX1005 ¶(0053)) and Honda teaches wireless charging using receive coils. Honda also shows an external wireless charging device, which it terms a “station”:



See EX1006 at 2, 3 (Figs. 1, 2). This station passes wireless power to the receive coil through a rear cover glass (similar to that of Kotanagi), using the physics of induced currents and magnetic flux. Honda illustrates magnetic flux in its Figure 10:

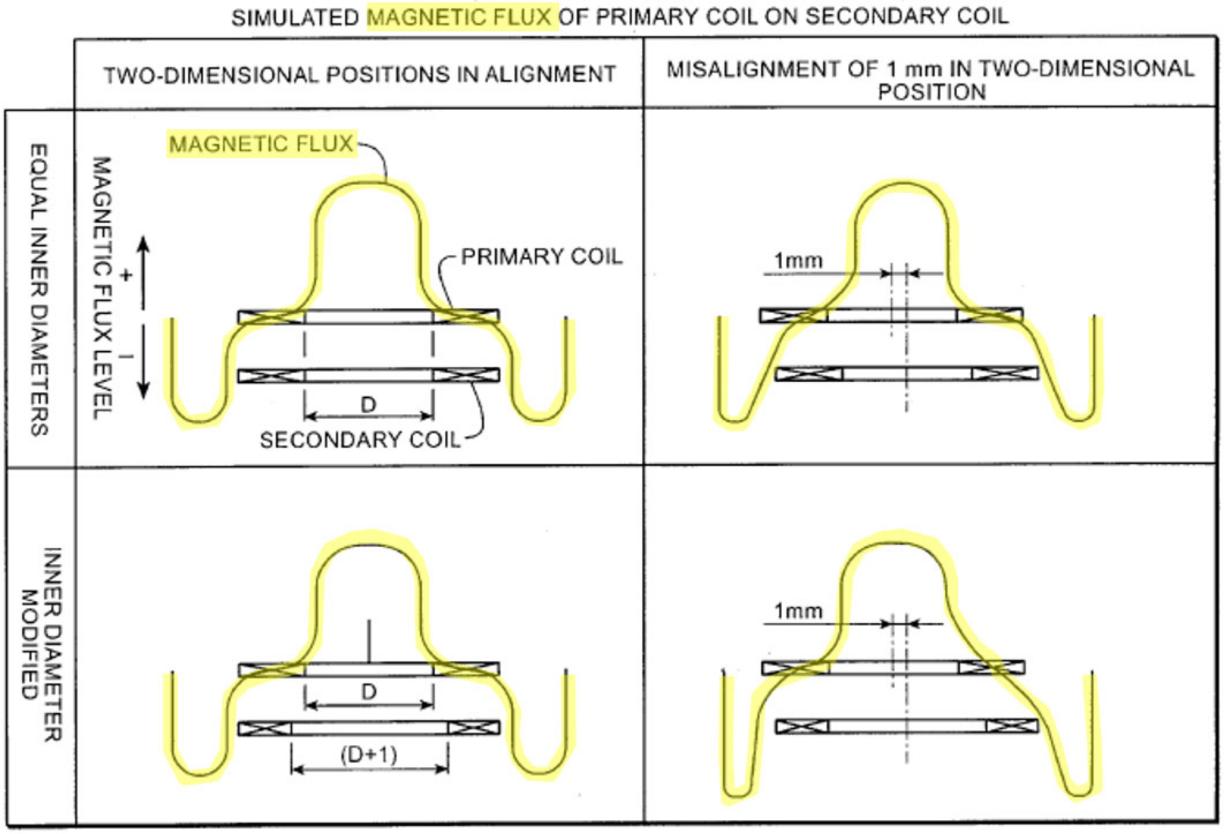


FIG._10

See id. at 9 (Fig. 10). This charging effect occurs as wireless power traverses a cover glass:

> A station-side coil 110 is arranged in the portion of the socket 101 of the station 100, facing the watch-side coil 210, and is covered with a cover glass 111 . . . When the electronic watch 200 is placed onto the station 100, the station-side coil 110 and the watch-side coil 210 are physically out of contact with each other, but magnetically coupled with each other because the surfaces of coil winding of both coils are generally in parallel to each other.

Id. 6:28–40.

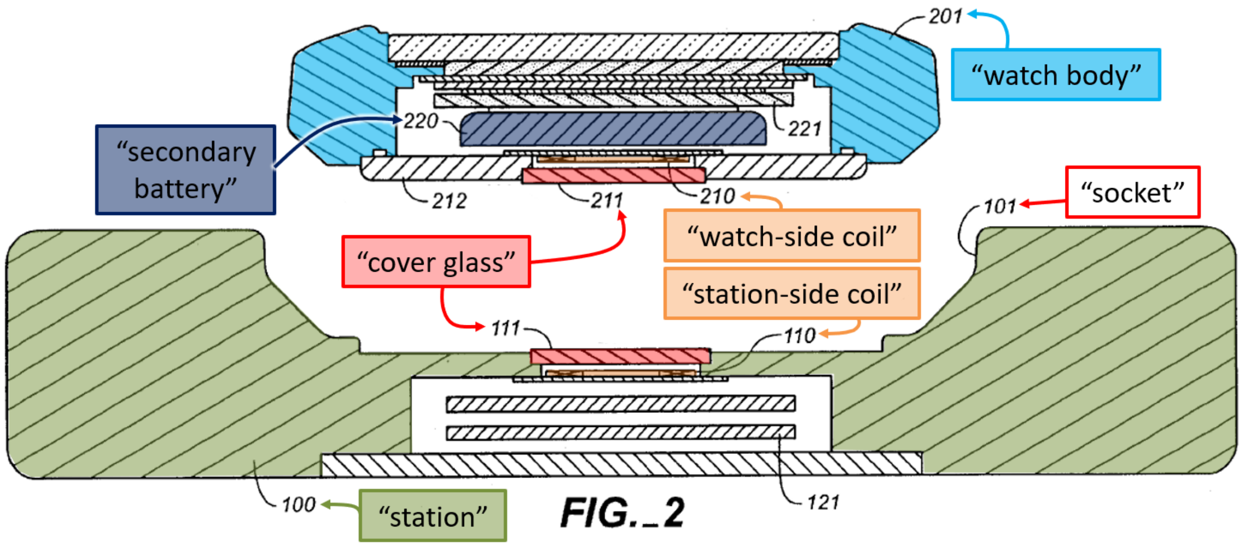


FIG._2

See id. 1006 at 3 (Fig. 2). Thus, a POSITA would have understood that charging coils in both the charging station and the watch body must be aligned and at an acceptable distance.

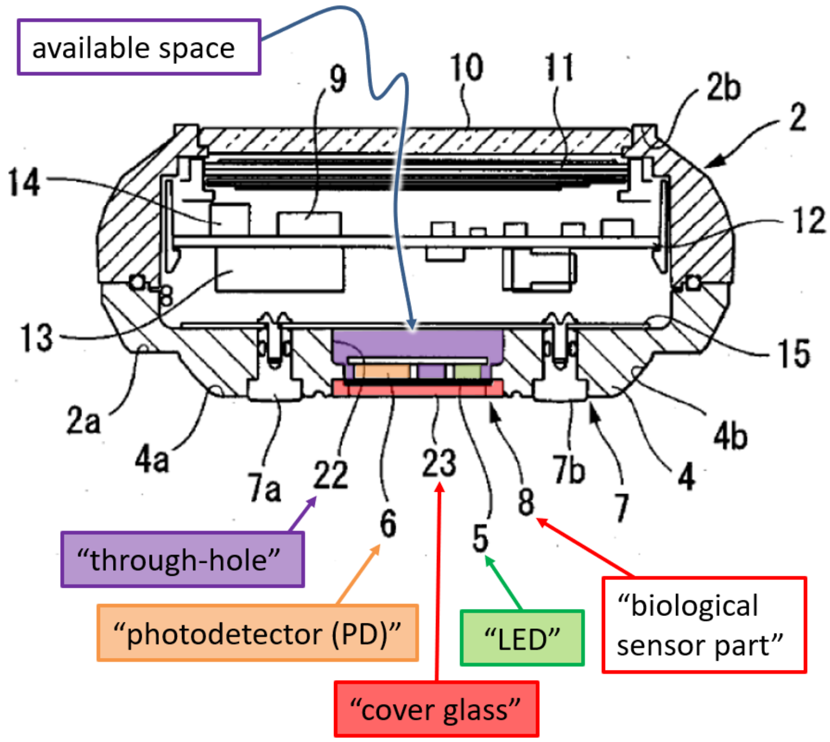
Kotanagi's cover glass is already centrally located at the base of the device consistent with Honda's wireless charging design. A POSITA would have known to modify Kotanagi's device based on Honda's teachings to align a charging receive coil behind this cover glass (in a similar position and with a similar size to that taught in Honda). With this straightforward modification (motivated, for example, by Kotanagi's own reference to "contactless" charging and Honda's teaching of how to do so in a watch-style device), the cover would be "configured to pass wireless power" in the claimed manner. Accordingly, Kotanagi and Honda teach the cover "configured to pass wireless power from an external wireless charging device to the wireless charging receive coil." EX1003 ¶127–129.

Based on the above, Claim 9 would have been obvious over Kotanagi and Honda prior to the filing of the '783 patent.

g. Motivation to Combine

A POSITA at the time of the invention would have been motivated to make the modifications based on teachings of both Kotanagi and Honda and would have had a reasonable expectation of success. Kotanagi teaches a pulse rate biosensor watch that may be charged in a "contactless state," motivating a POSITA to look to Honda. EX1005 ¶(0053). Honda teaches wireless watch charging, but also refers to watch sensors for pulse/heart rate or heart rate of the body, motivating a POSITA to look to Kotanagi. EX1006 6:14–20; 8:40–42. EX1003 ¶130. Further, these two references are assigned to subsidiaries of the same Seiko parent company.

Given Honda's teaching of a wireless receive coil near a rear opening similar to that taught in Kotanagi (where both Honda's and Kotanagi's openings have a cover glass), a POSITA would have noticed the available space near Kotanagi's opening and been motivated to use that space for such a coil, with a reasonable expectation of success. The figure below shows this available space:



See EX1005 at 27 (Fig. 7). EX1003 ¶131.

Moreover, Honda's Figure 15 and related text teach metal covers are inferior for power transmission due to, e.g., eddy currents. EX1006 at 14; *id.* at 2:48–50 ("eddy currents take place in the electrically conductive metal material, weakening the electromagnetic coupling"). A POSITA would thus have aligned Honda's coil with Kotanagi's opening such that power could pass through the cover. EX1003 ¶132.

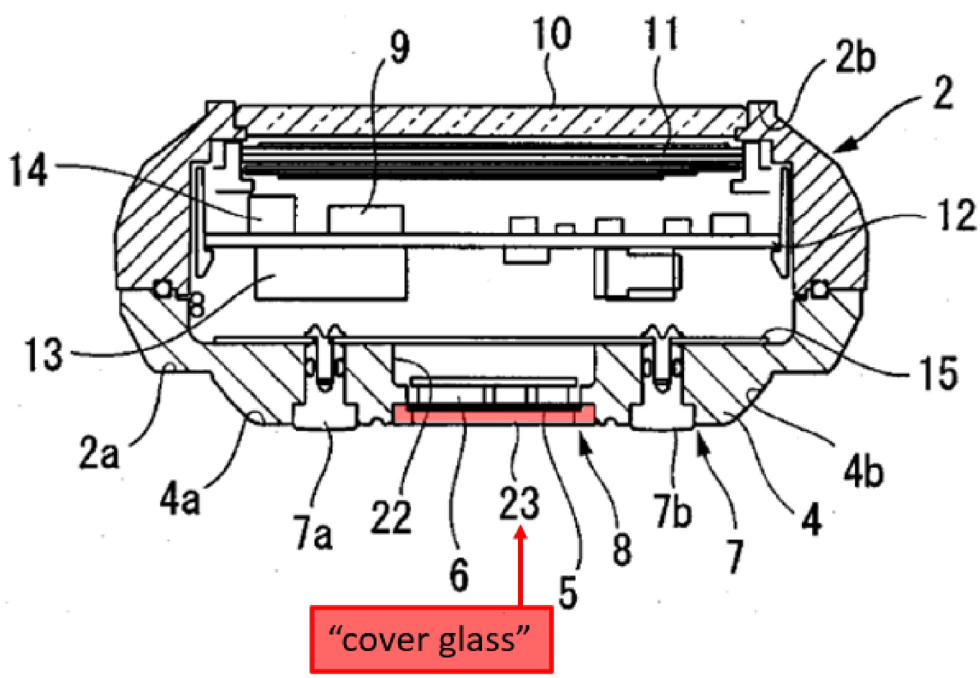
For at least the above reasons, one of ordinary skill would have been motivated to substitute Honda's charging components for those of Kotanagi in order to implement the express teachings of Kotanagi to implement a contactless or wireless charging system. EX1003 ¶133.

This motivation to combine also applies to the other Ground 1 combinations and dependents from Claim 9. EX1003 ¶134. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 10

Claim 10 depends from Claim 9 and adds "**the housing is formed from a metal material; and the cover is formed from a non-metal material**."

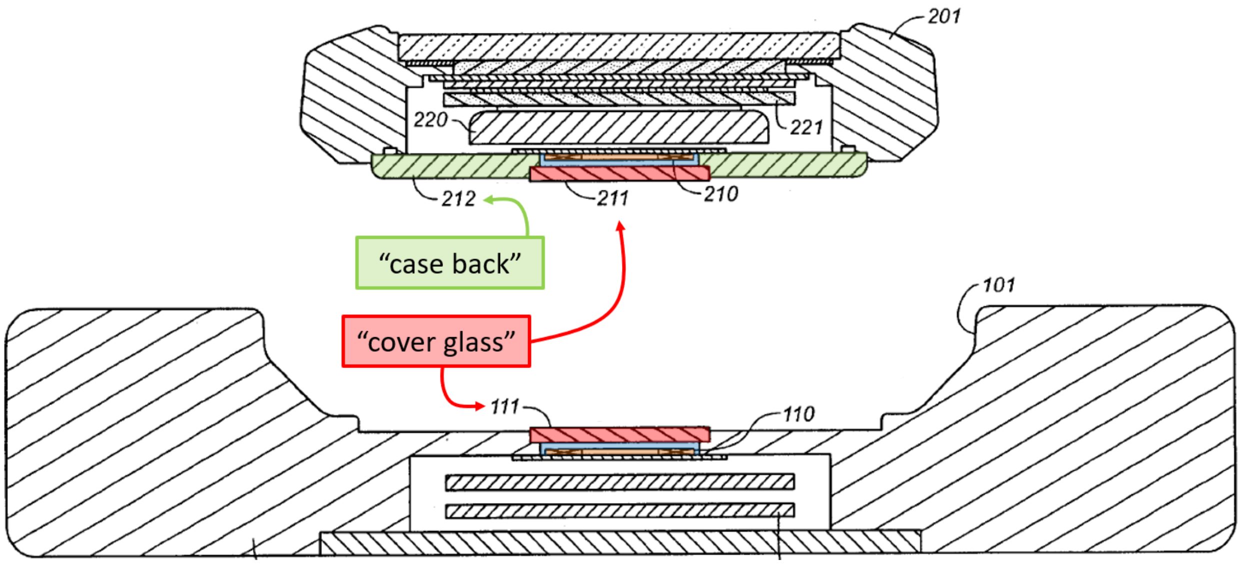
Kotanagi teaches metal for the housing: "The housing 2 described above is made of plastic **or a metal material** such as aluminum . . . ." EX1005 ¶(0048) (emphasis supplied). Kotanagi also teaches a cover glass 23 that passes optical signals from PD 5 and LED 6:



See id. at 27 (Fig. 7). Based on this figure and the related descriptions, Kotanagi

teaches using a different, non-metal material (such as ceramic, glass, etc.) for the cover glass. EX1003 ¶136.

Similarly, Honda teaches a metal case and a non-metal (glass) cover:



See EX1006 at 3 (Fig. 2). "In the first embodiment, the case back 212 (typically made of a metal) and the cover glass 211 are arranged as shown in FIG. 2." EX1006 15:47–49. Honda teaches that "the cover glasses 211 and 111 may be replaced with other insulating materials." *Id.* 16:14–15.

Honda also explains that non-metal covers are useful for transmitting power, using its Figure 15 to contrast poor transmission efficiency for different thicknesses of stainless steel with much higher transmission efficiencies of glass and glass combinations:

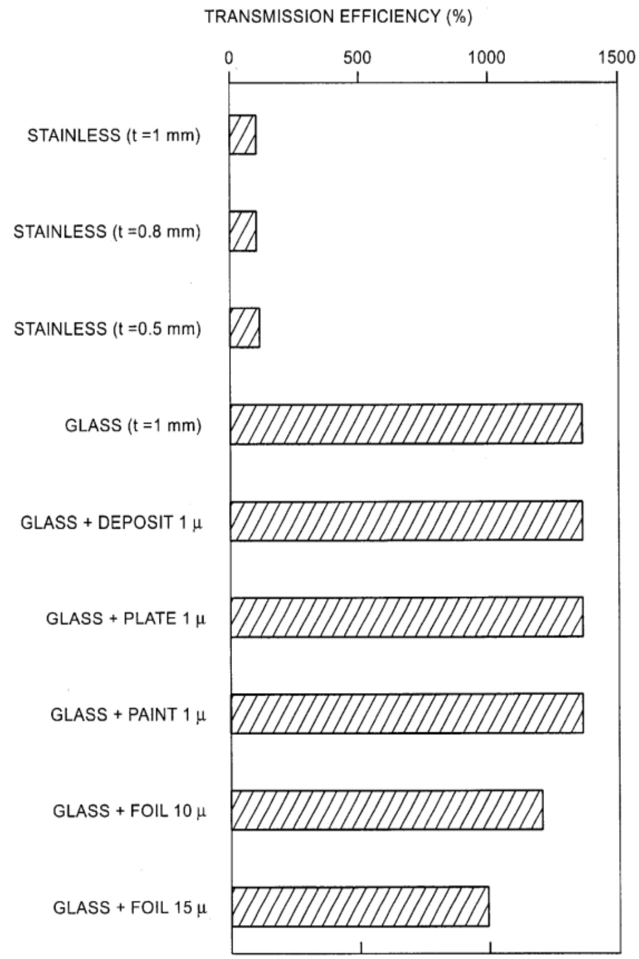


FIG._15

Id. at 14 (Fig. 15); *see id*. 2:48–50

A POSITA would have been motivated to use the non-metal cover teachings of Kotanagi and Honda because the POSITA would have known from basic principles of electrical shielding that complete metal enclosures prevent electromagnetic charge from penetrating. This is confirmed by Honda's experiments in this setting. EX1006 13:33–63. Thus, to achieve the wireless charging goal expressed in Kotanagi, a POSITA would have naturally used a non-

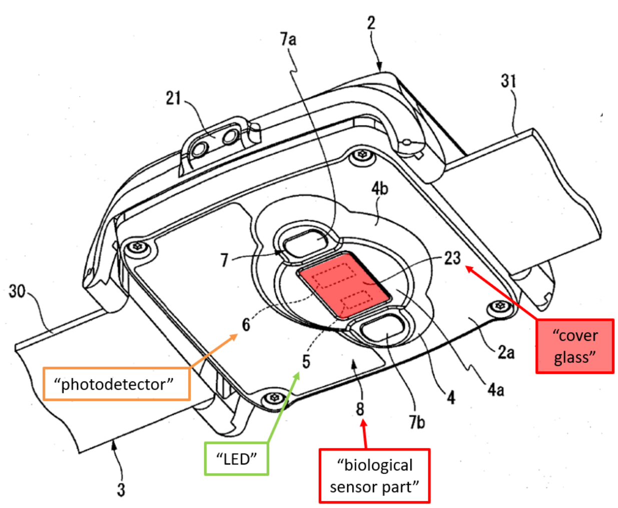
metal material as a cover for a wireless charging coil. EX1003 ¶139.

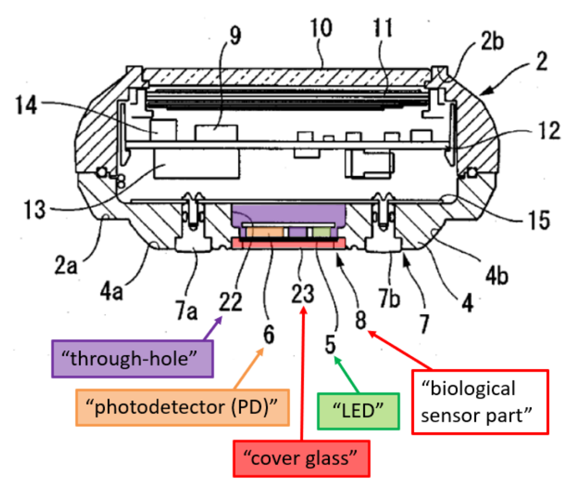
Based on the above, Claim 10 would have been obvious over Kotanagi and Honda.

3. Dependent Claim 11

Claim 11 depends from Claim 9 and adds "**the wireless charging receive coil has a coil diameter that is less than a diameter of the biosensor module; and the wireless charging receive coil is configured to receive the wireless power through the biosensor module**."

Consistent with the construction of "biosensor module" in § II(F)(2) above, Kotanagi teaches a biological sensor part: "[t]he LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." EX1005 ¶(0055).

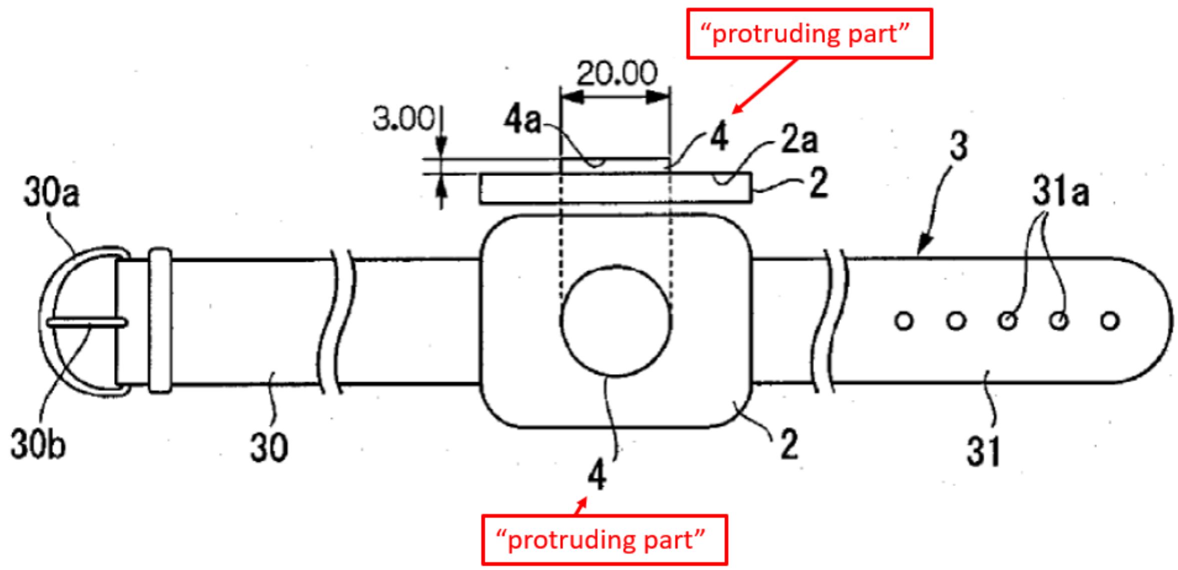




See id. at 26–27 (Figs. 5, 7). Because in the '783 patent the "biosensor module" includes both biosensors and a cover glass, Kotanagi's cover glass, LED 5, and PD

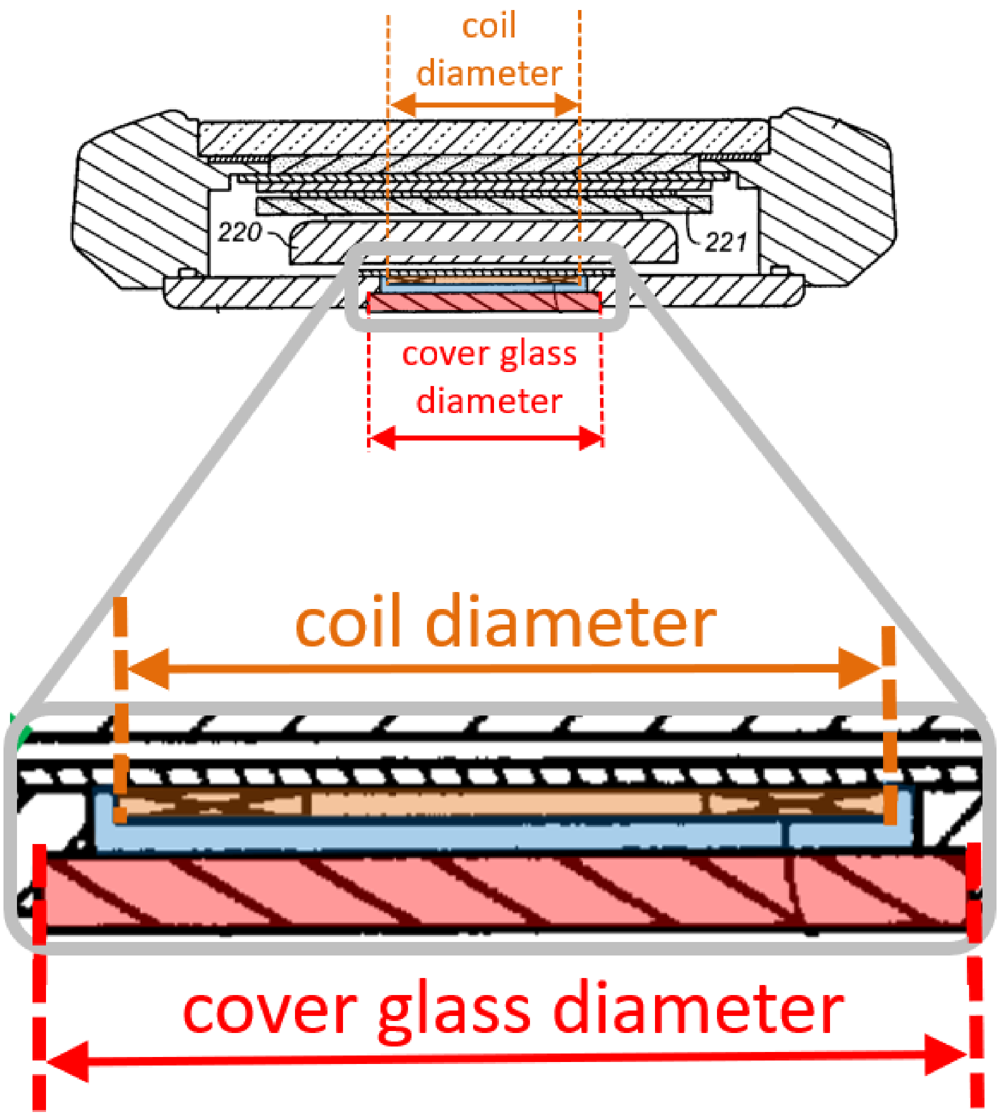
6 teach the claimed biosensor module. EX1003 ¶142.

Although the "cover glass" in Kotanagi's Figure 5 is not circular, Kotanagi teaches a round disk in its Figure 8: "the protruding part 4 may be formed so that the outer periphery is circular" and Kotanagi describes its diameter: "the diameter of the protruding part 4 illustrated in FIG. 8 is set to 20 mm." EX1005 ¶(0076).



See id. at 28 (Fig. 8). Accordingly, a POSITA would have understood that Kotanagi's biosensor module could be similarly round and therefore have a "diameter."

In the same field of endeavor (e.g., biosensing watches), Honda teaches a wireless charging receive coil, located within a rear opening spanned by a cover glass. EX1006 at 3 (Fig. 2). Honda teaches that the wireless charging receive coil has a diameter smaller than that of its cover glass:



See EX1006 at 3 (Fig. 2).

Honda's watch device is configured to receive wireless power through the cover glass by virtue of magnetic coupling of parallel coils. *Id.* 5:1–7.

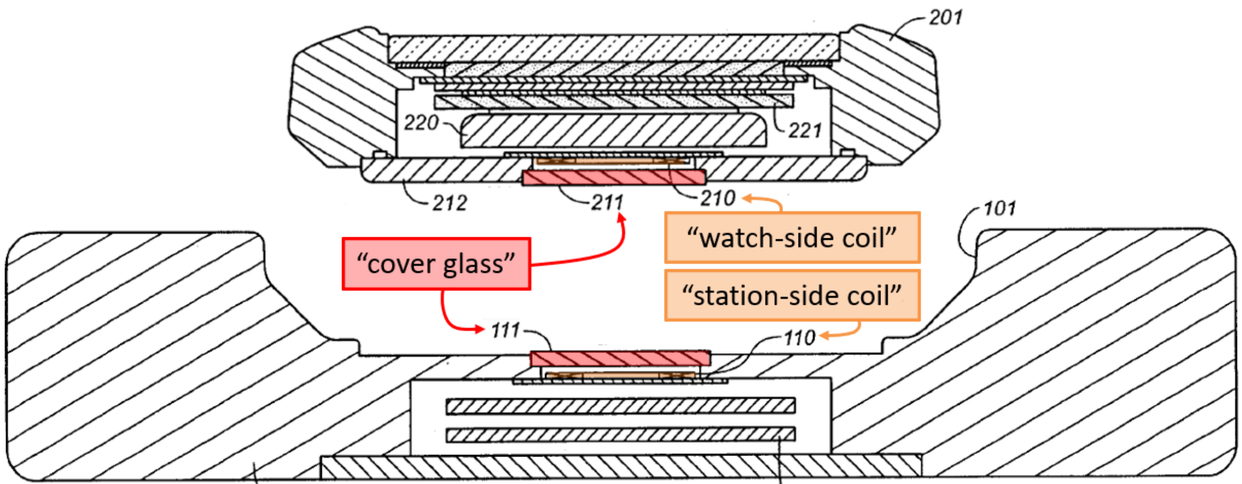


FIG._2

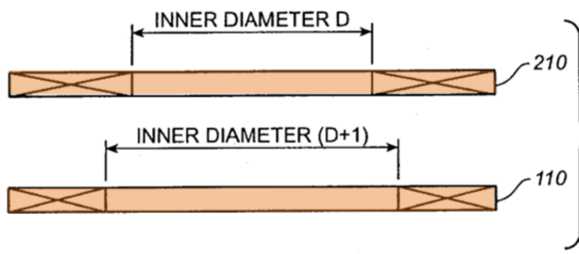
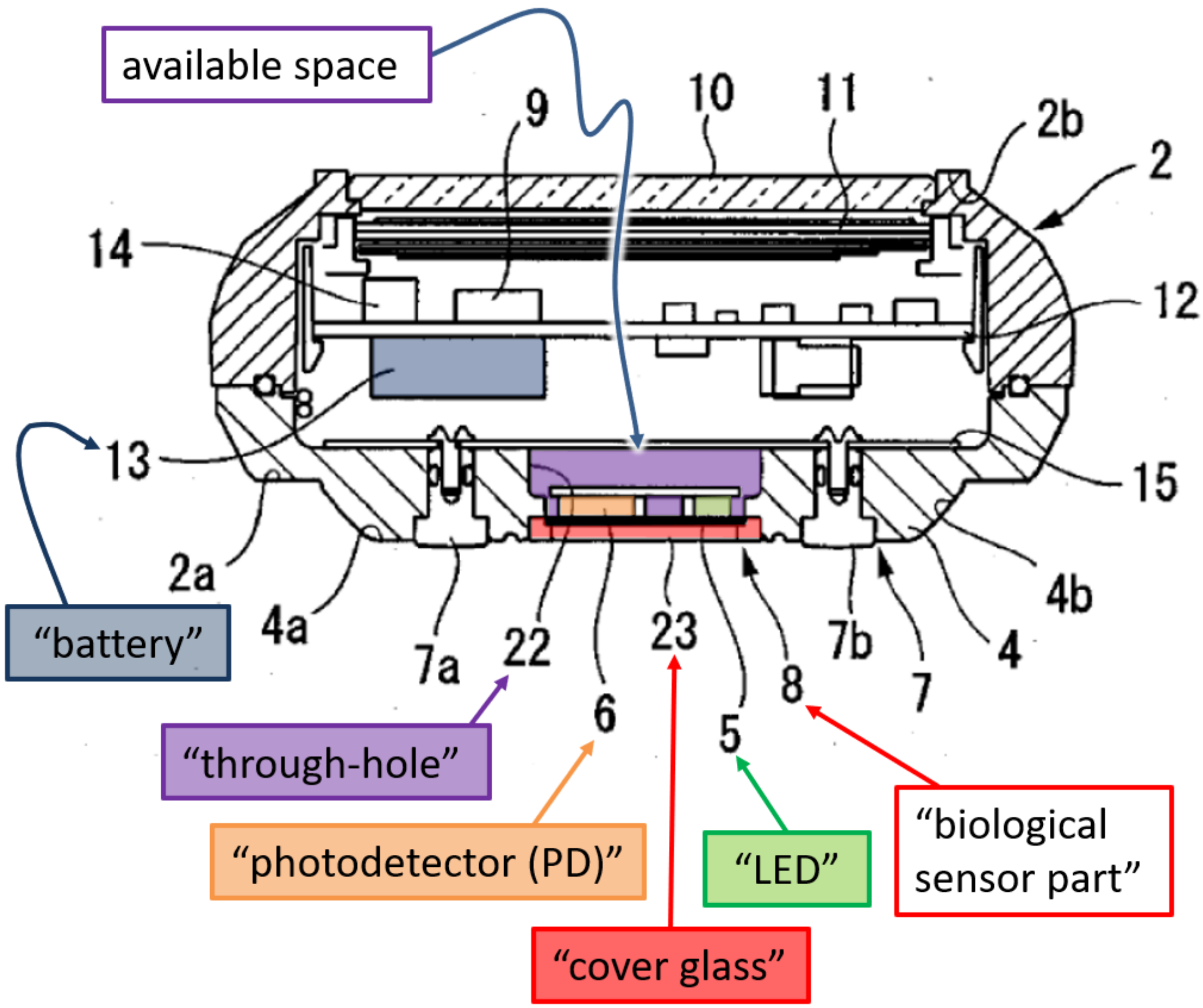


FIG._3

See id. at 3 (Figs. 2, 3).

Given this and Kotanagi's teaching of a "biological sensor part" with an LED and photodetector "disposed adjacent to one another . . . so as to touch the inside of the glass cover 23" (*see* EX1005 ¶(0055)), a POSITA would have used Honda's teachings to either: 1) modify Kotanagi to position a wireless charging coil behind Kotanagi's cover glass, LED, and PD; or 2) enlarge Kotanagi's opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD. In either case, the resulting magnetic flux would pass through the biosensor module, including the cover glass, as taught by Honda. The purple shading in the figure below shows that space was already available in

Kotanagi's "through-hole" behind and around the outside of the other listed components, making the modification from Honda simple and feasible, with a high expectation of success:



See EX1005 at 27 (Fig. 7).

Moreover, in view of teachings such as that of Honda's Figure 15 (metal covers are inferior for power transmission due to, e.g., eddy currents) (EX1006 at 14; *id.* at 2:48–50 "eddy currents take place in the electrically conductive metal

material, weakening the electromagnetic coupling"), a POSITA would have known that wireless charging occurs more effectively when a charging coil is exposed through a large enough opening, so that any metal housing does not create an electrical shielding effect that tends to prevent electromagnetic transmission. A POSITA would have also known (*e.g.*, from the experiments summarized in Honda's Fig. 15, EX1006 at 14) that charging occurs most efficiently through an opening, not through a metal cover itself. EX1003 ¶146.

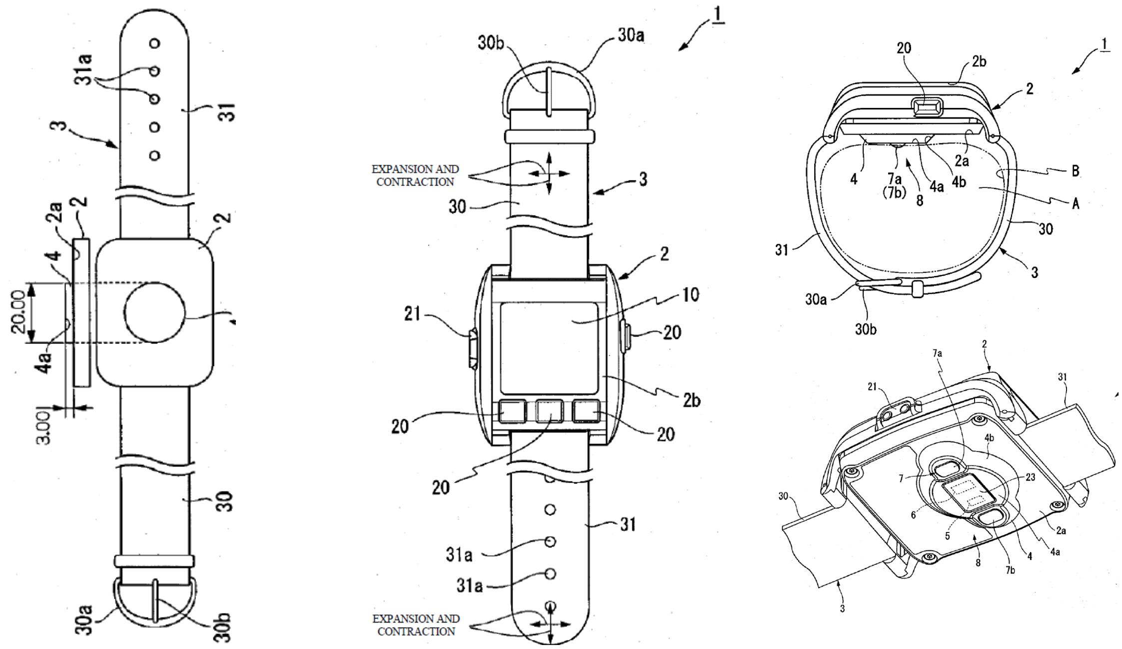
Accordingly, a POSITA would have expected success in modifying Kotanagi in view of Honda. This combination teaches the claimed "coil diameter that is less than a diameter of the biosensor module," where the coil would be "configured to receive the wireless power through the biosensor module." That is, power would be received through at least the cover glass that forms part of that biosensor module. EX1003 ¶147.

As shown above, Claim 11 would have been obvious over Kotanagi and Honda.

4. Independent Claim 15

a. "An electronic watch, comprising:

Kotanagi describes a "wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist." EX1005 ¶(0044).



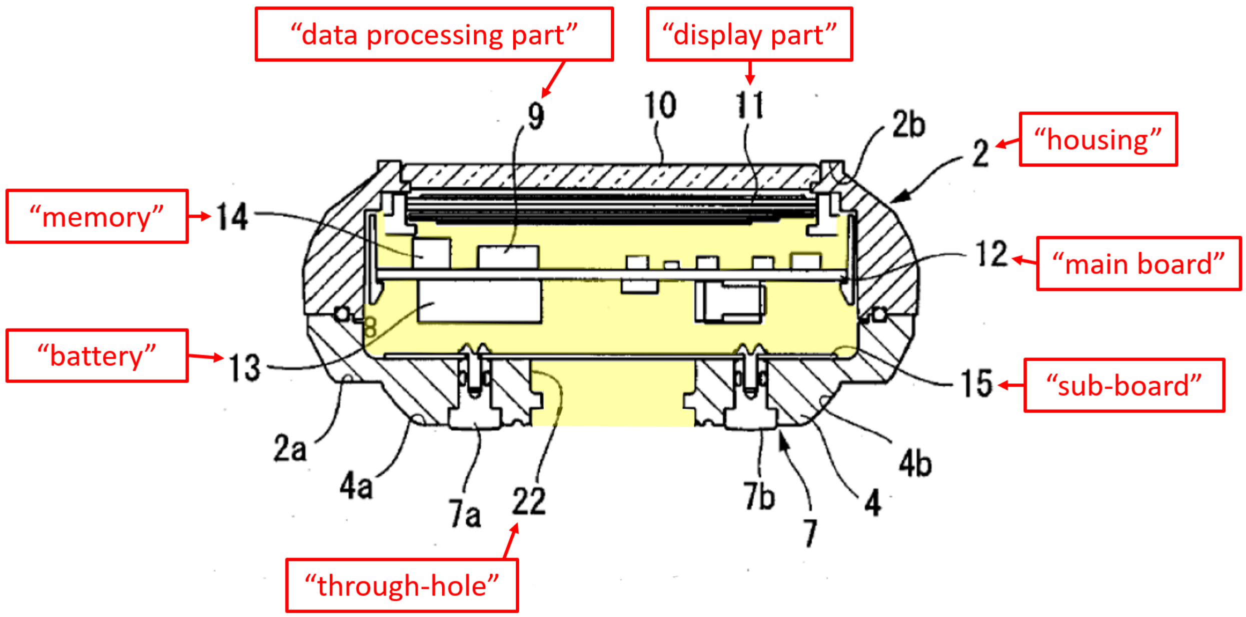
Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. a housing defining an interior cavity and a bottom portion having an opening;

This wristwatch-type device described by Kotanagi has a "housing" with several components "inside," demonstrating that it teaches the claimed "interior cavity":

> [A]s illustrated in FIGS. 6 and 7, a main board 12 is provided **inside the housing** 2, and the data processing part 9, the display part 11, a rechargeable battery 13 that can be recharged, a memory 14 for recording the pulse rate, a sub-board 15, and various other electronic parts are mounted on or electrically connected to the main board 12.

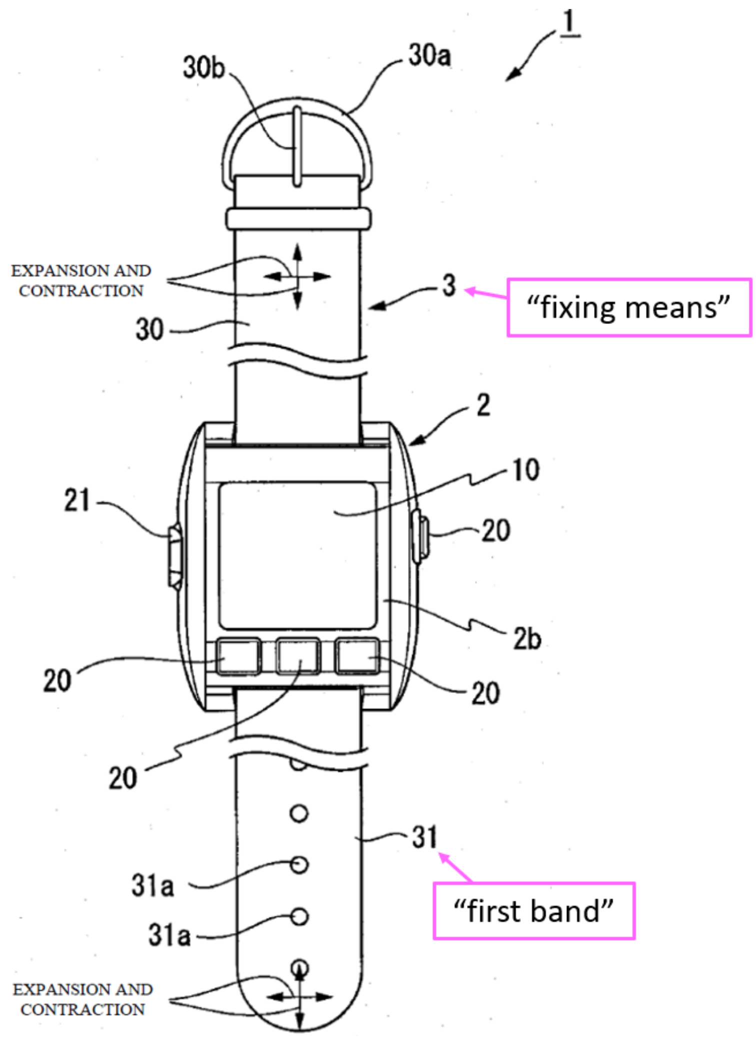
Id. ¶(0049).



See id. at 27 (Fig. 7) (biosensor module removed). Kotanagi also describes a "through-hole 22 passing through the outside and the inside of the housing 2" and "formed in the center of the lower surface 4a of the protruding part 4." *Id.* ¶(0055). In the cross-section above, the interior cavity and the through-hole 22 are shaded in yellow.

c. a band attached to the housing and configured to secure the electronic watch to a user;

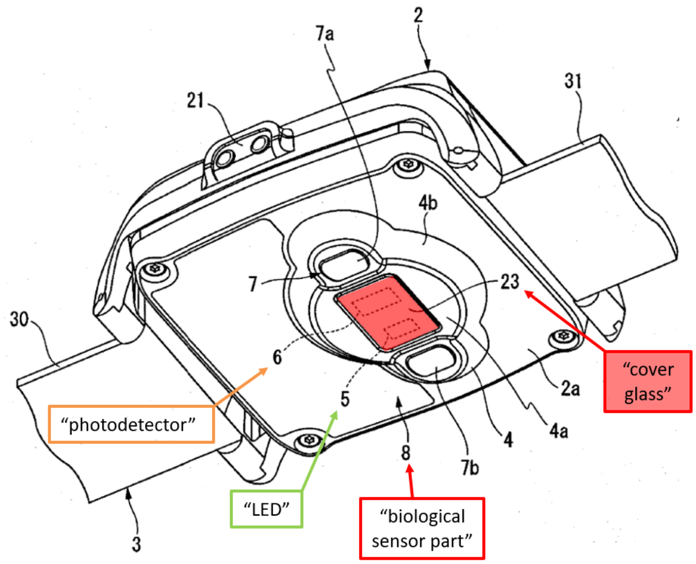
Kotanagi has a "means for fixing" the device "to an arm" (*id*., Abstract) and explains: "The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist." (*id*. at ¶(0060)).



See id. at 23 (Fig. 1).

d. a biosensor module positioned along the bottom portion of the housing and configured to transmit optical signals and receive reflected optical signals through the opening of the housing; and

Consistent with the construction of "biosensor module" in § II(F)(2) above, Kotanagi teaches a biosensor module with a cover glass.

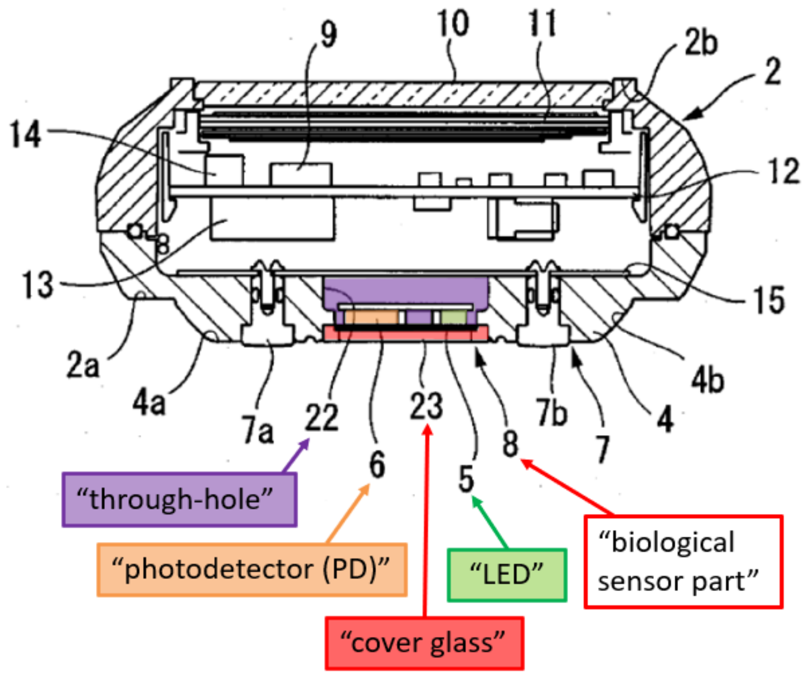


See EX1005 at 26 (Fig. 5).

Kotanagi further explains where the biosensor module is positioned, and how optical signals are transmitted through an opening in the bottom of its housing, in the context of Figure 7:

> [A]s illustrated in FIG. 7, a through-hole 22 passing through the outside and the inside of the housing 2 is formed in the center of the lower surface 4a of the protruding part 4, and a cover glass 23 is fixed to the housing 2 so as to block the through-hole 22. The LED 5 and the PD 6 are disposed adjacent to one another in a direction orthogonal to the longitudinal direction of the housing so as to touch the inside of the glass cover 23. That is, the LED 5 and the PD 6 are configured so as to be dropped into the protruding part 4. As a result, the LED 5 and the PD 6 are as close to the living body surface B as possible.

EX1005 ¶(0055).



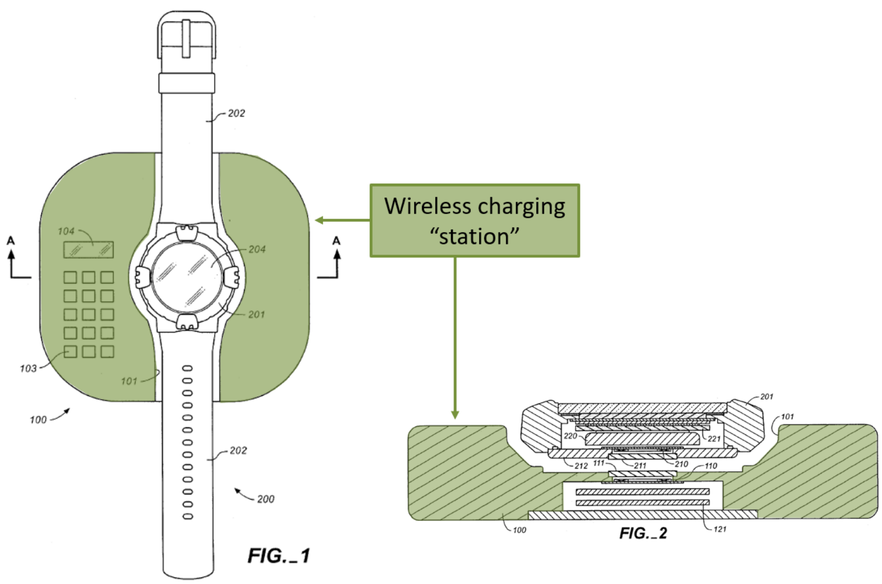
See EX1005 at 27 (Fig. 7).

e. a wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing.

Kotanagi teaches that "a transformer or the like for supplying power to a recharger and to the inside of the housing 2 may be provided ***so as to recharge the rechargeable battery 13 in a contactless state***." EX1005 ¶(0053) (emphasis added). A POSITA would have known at the time of the '783 Patent's invention that transformers use coils, that such contactless charging involves a wireless charging receive coil, and that this coil would be positioned within the interior of the cavity (like the rechargeable battery 13). Kotanagi teaches its watch housing can be metal and a POSITA would have understood that wireless charging coils

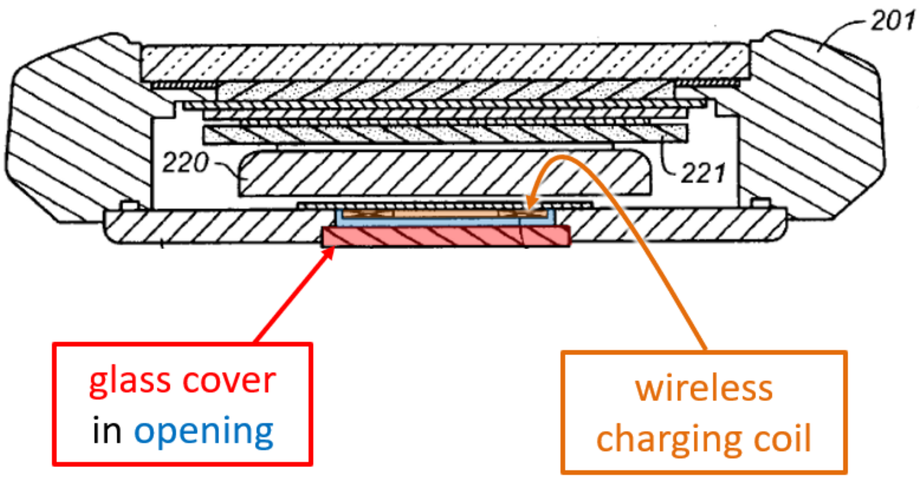
need to be positioned to allow charging through an opening in metal housing to avoid shielding effects and low transmission efficiency. Accordingly, Kotanagi teaches every limitation of this claim. However, to further support that this claim would have been obvious, Honda is discussed below. EX1003 ¶154.

Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. Honda's Figure 1 shows a plan view of the watch in a charging station, with Figure 2 showing a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2).

Like Kotanagi, Honda teaches a biosensor: "the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–19. Like Kotanagi, the Honda watch has a cover glass that spans an opening in the bottom face of the watch. Behind this cover, Honda illustrates a "wireless charging receive coil" "positioned within the interior cavity," as claimed:



See id. at 3 (Fig. 2). Moreover, Honda's coil is "configured to receive wireless power through the opening" and its cover glass through magnetic coupling of parallel coils. *Id*. 5:1–7.

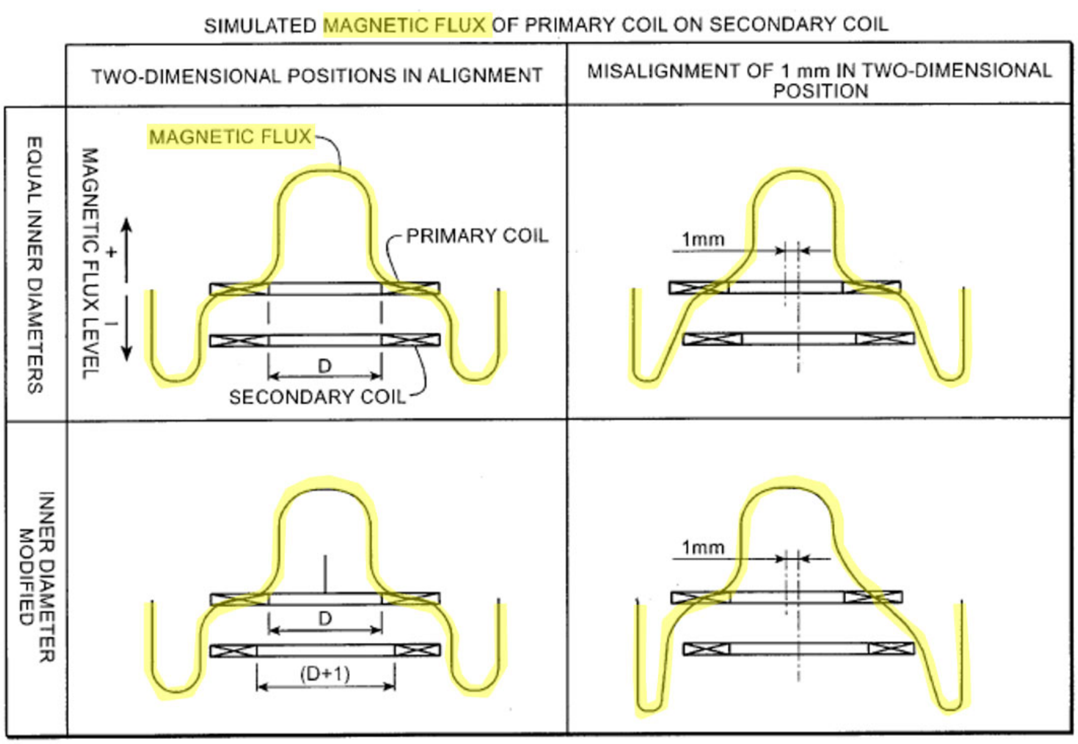
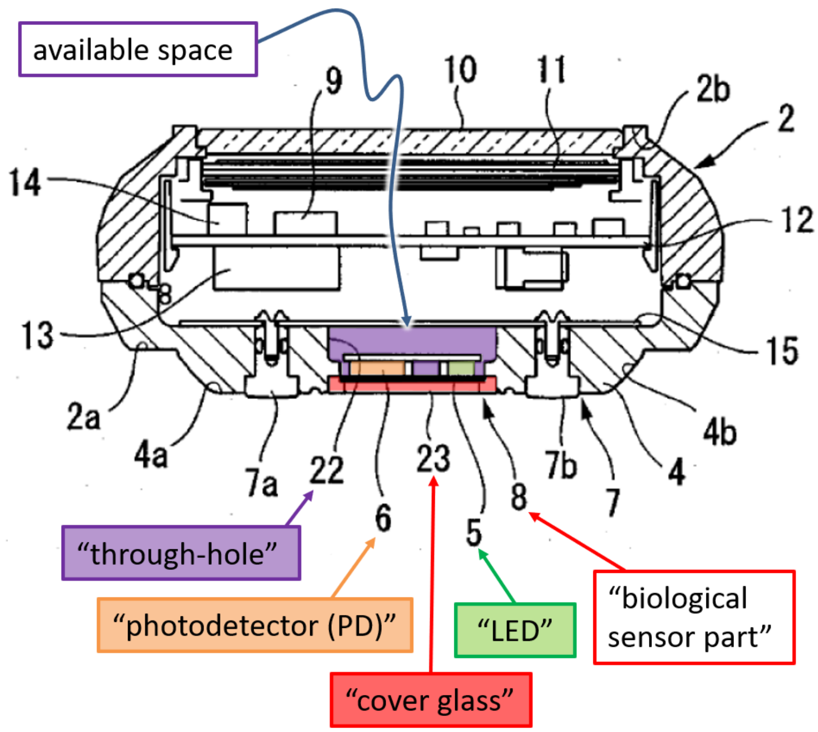


FIG._10

See id. at 9 (Fig. 10).

Accordingly, a POSITA would have used the wireless charging disclosure and goal of "contactless" charging expressed by Kotanagi (EX1005 ¶(0053)) as a motivation to combine with the teachings of Honda. Honda's teachings further enable the wireless charging Kotanagi mentions as desirable. To do this, a POSITA would have (after adjusting for any scale differences) positioned a wireless charge coil in the available space of Kotanagi's through-hole 22:



See EX1005 at 27 (Fig. 7). Thus, Kotanagi, modified by Honda, would include the claimed "wireless charging receive coil positioned within the interior cavity." EX1003 ¶157.

Kotanagi's cover glass is already centrally located at the rear, so a POSITA would have readily modified this device based on Honda's teachings to include a

charging receive coil behind the cover glass (in a similar position and with a similar size to that taught in Honda). With this straightforward modification, (motivated, for example, by Kotanagi's own reference to "contactless" charging and Honda's teaching of how to do so in a watch-style device), the coil would be "configured to receive wireless power through the opening of the housing" as claimed. Accordingly, Kotanagi and Honda teach the claimed "wireless charging receive coil positioned within the interior cavity and configured to receive wireless power through the opening of the housing." EX1003 ¶158.

A POSITA would have been motivated to combine, and expected success, in combining Kotanagi and Honda for at least the reasons provided above and in section IV(A)(1)(g). This expectation of success and motivation to combine also applies to the other Ground 1 combinations and dependents from Claim 15. EX1003 ¶159. Further motivations to combine are provided throughout this petition.

Thus, Claim 15 would have been obvious in view of Kotanagi and Honda.

5. Dependent Claim 19

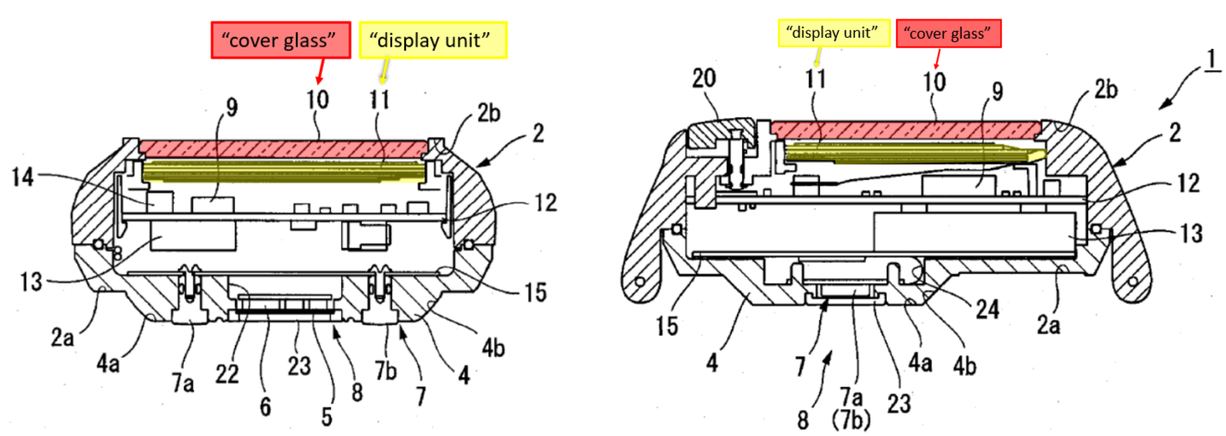
Claim 19 depends from Claim 15 and adds "**the electronic watch is configured to compute a health metric using the biosensor module; and the health metric is one or more of: a heart rate, a respiration rate, a blood oxygenation level, a blood volume estimate, or blood pressure**."

Kotanagi's watch uses its LED and photodetector to generate a "pulse signal (biological information signal)" (EX1005 ¶(0046)), satisfying the claimed computation of a "health metric" and "heart rate." Likewise, Honda's watch "detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–19. Accordingly, the claimed combination of Kotanagi, as modified by Honda, would also satisfy these limitations without further modifications. Thus, Claim 19 would have been obvious in view of Kotanagi and Honda. EX1003 ¶¶161.

6. Dependent Claim 20

Claim 20 depends from Claim 19 and adds "**the electronic watch includes a display; and the display is configured to display information associated with the health metric.**"

Kotanagi teaches a watch with a display.



See EX1005 at 27 (Figs. 7, 6).

After Kotanagi's "data processing part" "analyzes the signal to detect the pulse rate," it "displays the signal on the display part 11." EX1005 ¶(0066). Its "display part 11" is "for displaying the aforementioned pulse rate." *Id*. ¶(0048).

Moreover, it was common at the time to, if a health metric was calculated, at least display information "associated with" that metric. For example, Kateraas also teaches displaying the health metric (EX1014 [0043][6]), and many other relevant references teach this. EX1003 ¶¶164–169. Accordingly, the claimed combination of Kotanagi, as modified by Honda, would also satisfy these limitations without further modifications. A POSITA would have understood Kotanagi as modified by Honda to teach these limitations prior to the filing of the '783 patent (especially in view of the general knowledge at the time about displaying health metric information), rendering Claim 20 invalid. EX1003 ¶¶162–169.

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[6] In this petition, citations to documents having square brackets "[]" for paragraph numbering use brackets instead of paragraph symbols "¶."

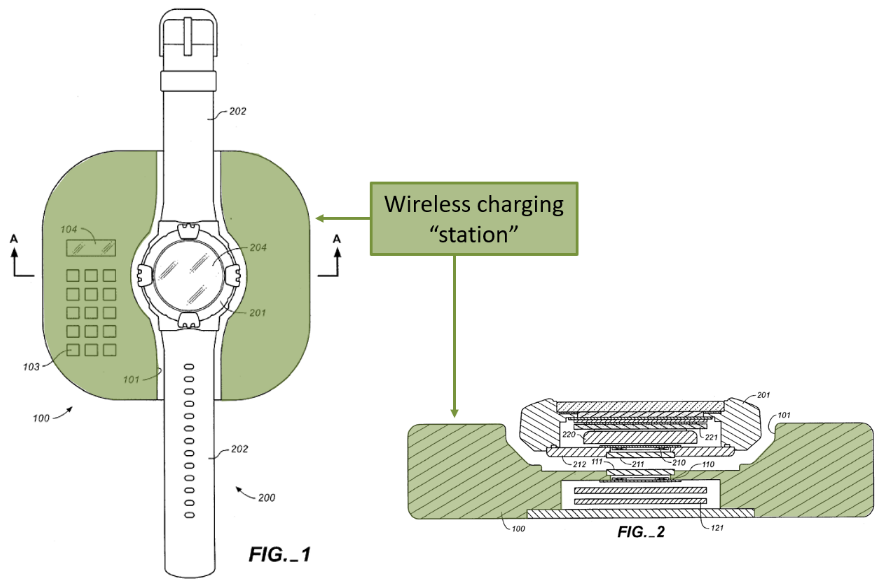
B. Ground 2: Claim 16 is unpatentable because it would have been obvious in view of Kotanagi, Honda, and optionally, in further combination with Park

1. Dependent Claim 16

Claim 16 depends from Claim 15 and adds "**the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; and the electronic watch is configured to magnetically couple with the external inductive power transmitter dock**."

Kotanagi's teaching of a "transformer or the like for supplying power to a recharger and to the inside of the housing" to "recharge the battery in a contactless state" (EX1005 ¶(0053)) would have been understood by a POSITA to teach a receive coil was configured to receive power from an external inductive power transmitter dock because contactless charging is known to use induction, and this always occurs from an external transmitter for contactless charging. EX1003 ¶172.

Honda, which issued in 2001, discloses an external transmitter (station 100). EX1006 6:28–35. Figure 2 shows a cross-section of this arrangement:



See EX1006 at 2–3 (Figs. 1, 2). Honda teaches that external and internal coils are “physically out of contact with each other, but magnetically coupled . . . .” EX1006 at 9 (Fig. 10); *id.* 6:38–39 (teaching “magnetically coupled with each other”). Honda schematically illustrates how its dock aligns coils (110, 210) for magnetic coupling:

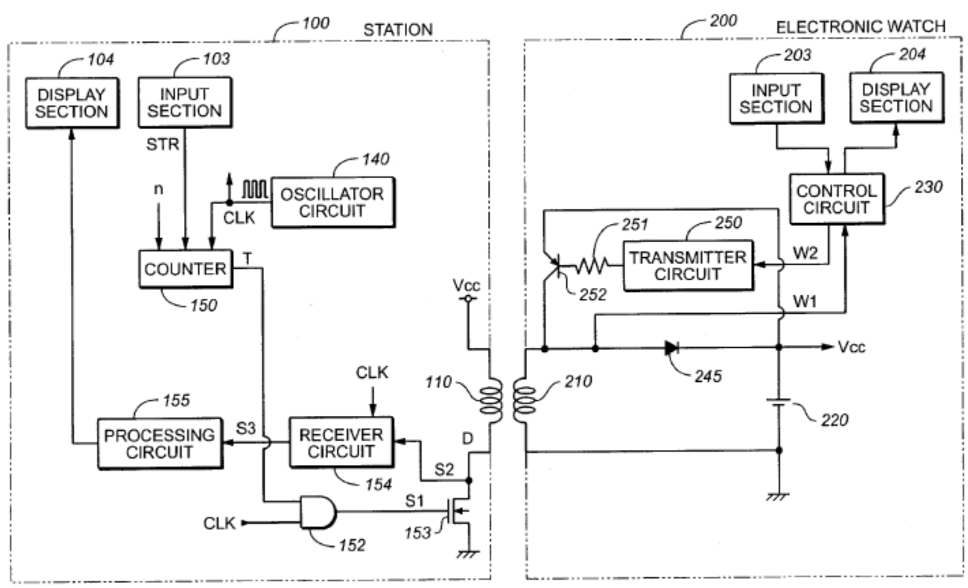
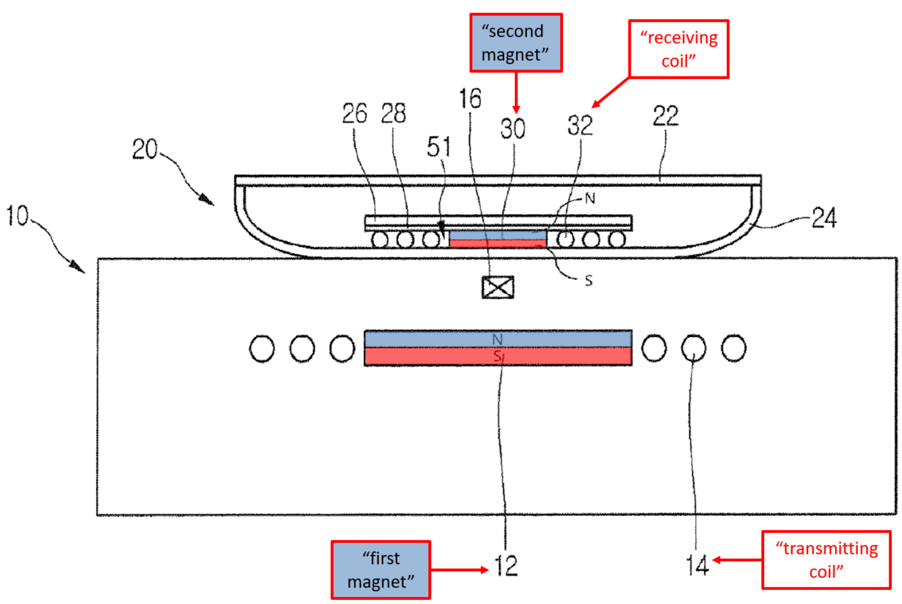


FIG._4

EX1006 at 4 (Fig. 4).

Thus, Claim 16 is obvious in view of Kotanagi and Honda.

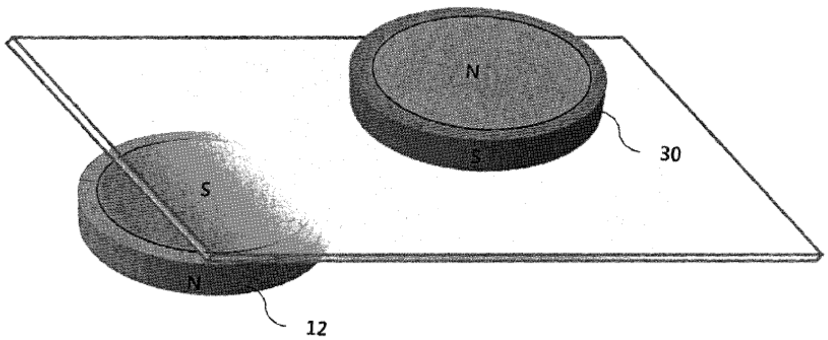
In addition to the magnetic coupling discussed above, the '783 specification also refers to magnetic alignment. EX1001 at EX1001 5:37–40; 43:36–41; 45:29–51 (e.g., discussing Fig. 19); *id*. at 25; EX1003 ¶¶175. Although Claim 16 does not refer to alignment, if "configured to magnetically couple" is construed to require, in addition to the magnetic coupling of induction, magnetic coupling for alignment, a POSITA would have been motivated by Honda (EX1006 1:48–59) to look to **Park**, which teaches using magnets to align devices in wireless charging stations:



See EX1015 at 50 (Fig. 14); EX1012 at 11 (Fig. 14). EX1003 ¶175.

Park explains that "attractive force may be generated between the first

magnet 12 and the second magnet 30" to optimize "wireless power transfer efficiency." EX1015 at 34; EX1012 [0204].



EX1015 at 52 (Fig. 16); EX1012 at 13 (Fig. 16). EX1003 ¶¶176.

A POSITA would have been motivated to combine these based at least on Honda's description of a "socket" where the watch body is "seated in alignment" in Honda's station. EX1006 6:4–11. Understanding the value and feasibility of alignment from both Honda and Park, a POSITA would have expected success in modifying Honda to include Park's permanent magnets. *Id.* at 1:48–58. Motivation also stems from Park, which teaches disadvantages of existing wireless charging schemes ("limited distance . . . efficiency is somewhat low.") EX1012 [0008]; EX1015 at 5. A POSITA would have used Park's solution: permanent magnets to reduce the distance, "thereby improving wireless power transfer efficiency." EX1012 [0192]; EX1015 at 32. EX1003 ¶¶177–178.

Based on the above, Claim 16 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 16 would have been obvious in view of Kotanagi

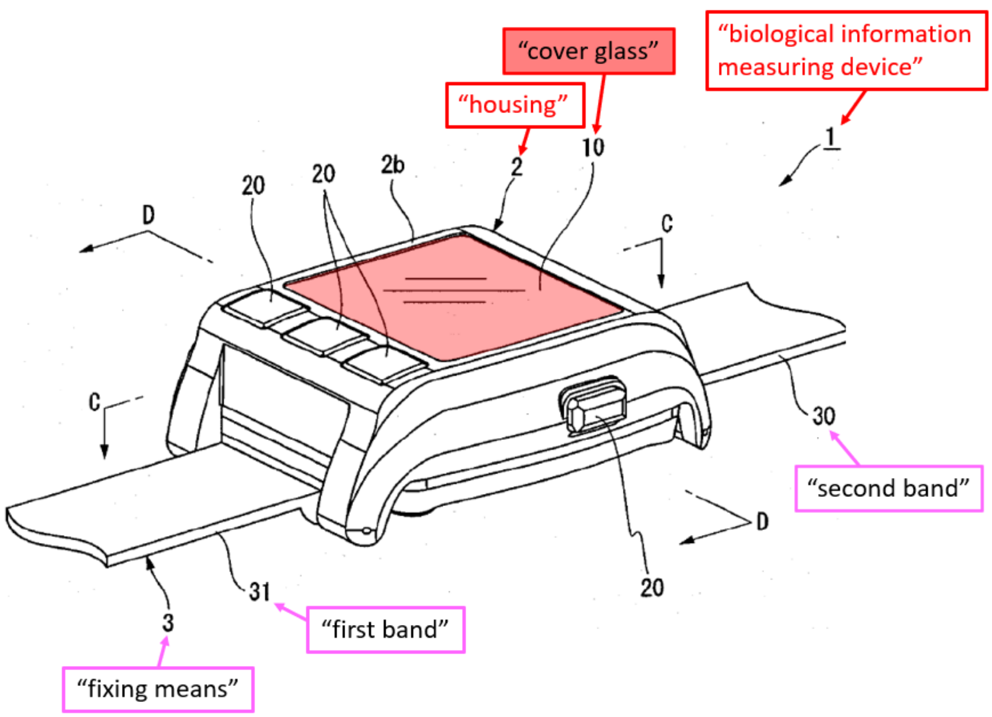
and Honda, combined with Park.

C. Ground 3: Claims 1–7 and 14 are unpatentable because they would have been obvious in view of Kotanagi, Honda, and optionally, in further combination with Kateraas

1. Independent Claim 1

a. "An electronic device, comprising: a housing defining a first opening opposite to a second opening; a band attached to the housing and configured to secure the electronic device to a user;"

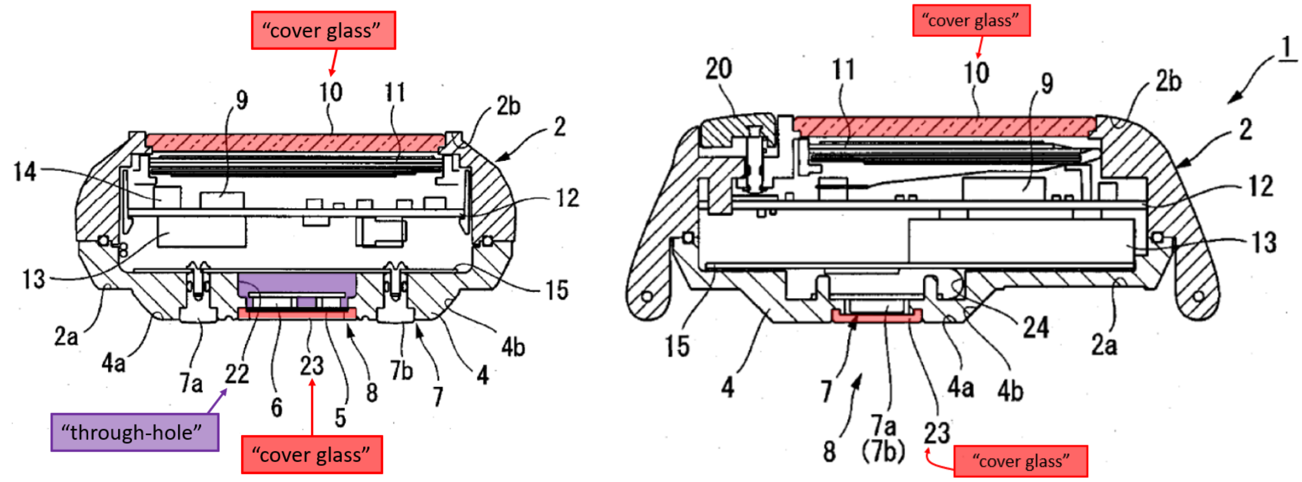
Kotanagi teaches these limitations.



See EX1005 at 25 (Fig. 4).

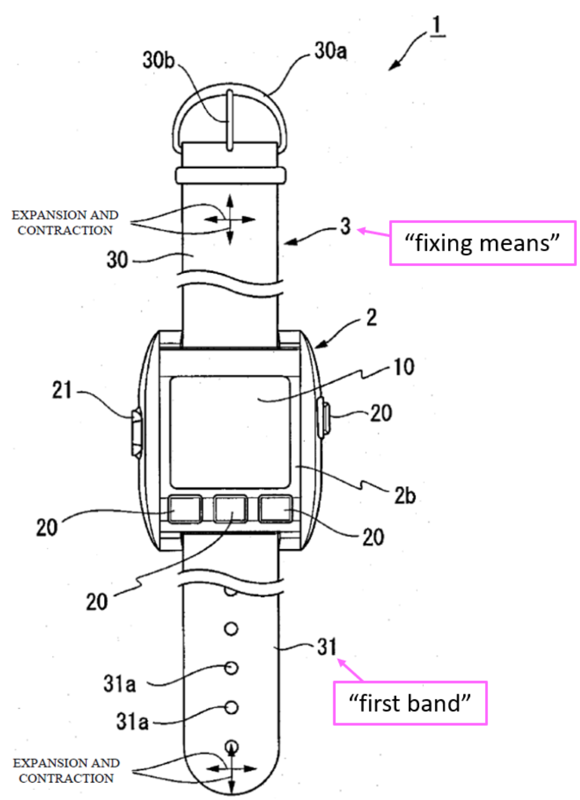
The "first opening" in Kotanagi's housing can be seen in the cross-sections of Figures 6 and 7 (below). The cover glass 10 that fills this opening has been shaded here, along with the second opening ("through-hole 22") and its cover glass

23:



See id. at 27 (Figs. 7, 6).

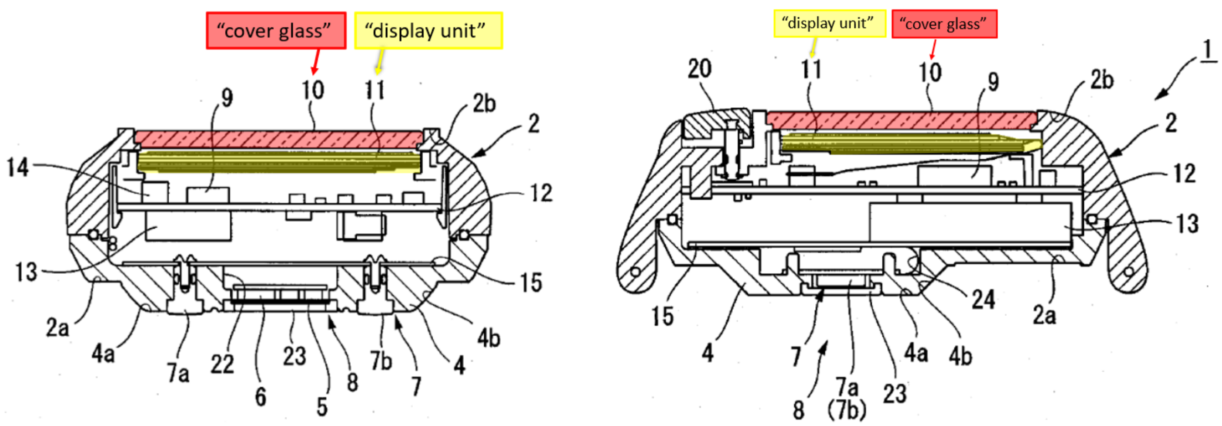
Kotanagi has a "means for fixing" the device "to an arm" (*id*., Abstract) termed a "band" that enables "mounting to the wrist A" (*id*. at ¶(0060)).



See id. at 23 (Fig. 1).

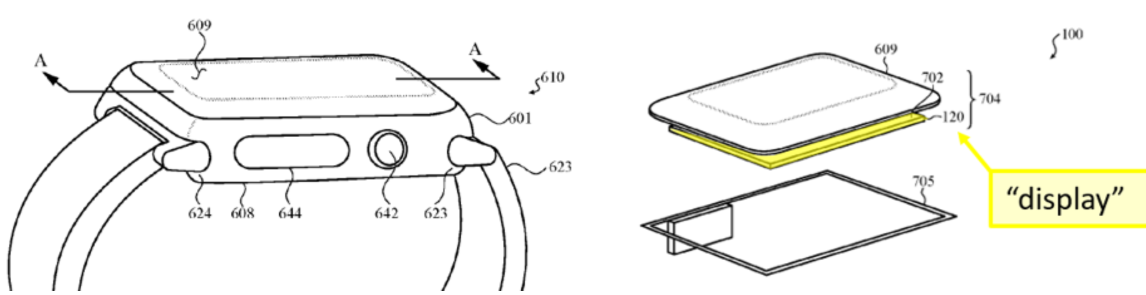
b. "a display positioned in the first opening;"

Kotanagi teaches "A cover glass 10 with a substantially square shape is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 for displaying the aforementioned pulse rate that is detected and various other information is disposed inside the cover glass 10." Ex 1005 at 11.



See EX1005 at 27 (Figs. 7, 6).

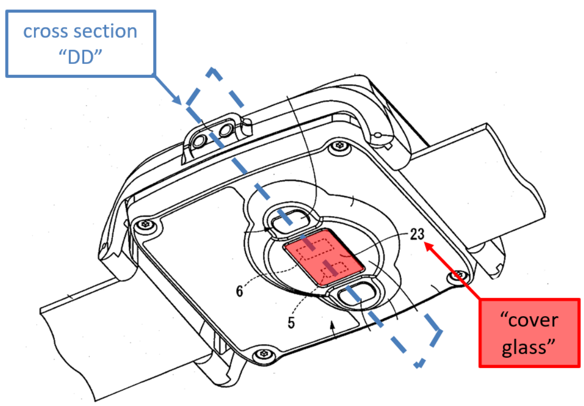
This is consistent with the '783 patent's display, which is also under a cover glass in the opening.

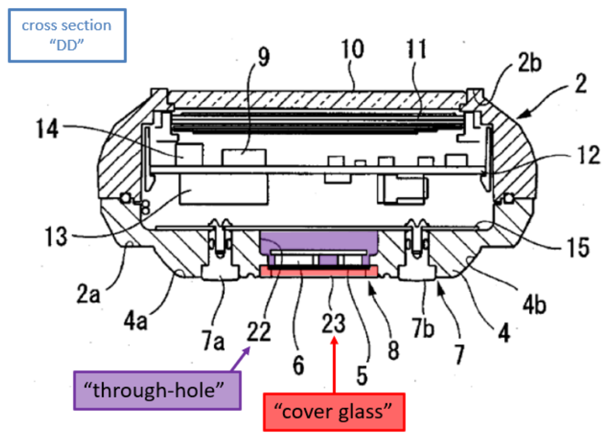


See EX1001 at 12–13 (Figs. 6, 7). Accordingly, Kotanagi teaches this limitation.

c. "a ceramic cover disposed over the second opening and forming a portion of an exterior surface of the electronic device;"

Kotanagi teaches "cover glass" forming a portion of its bottom surface and covering through-hole 22:

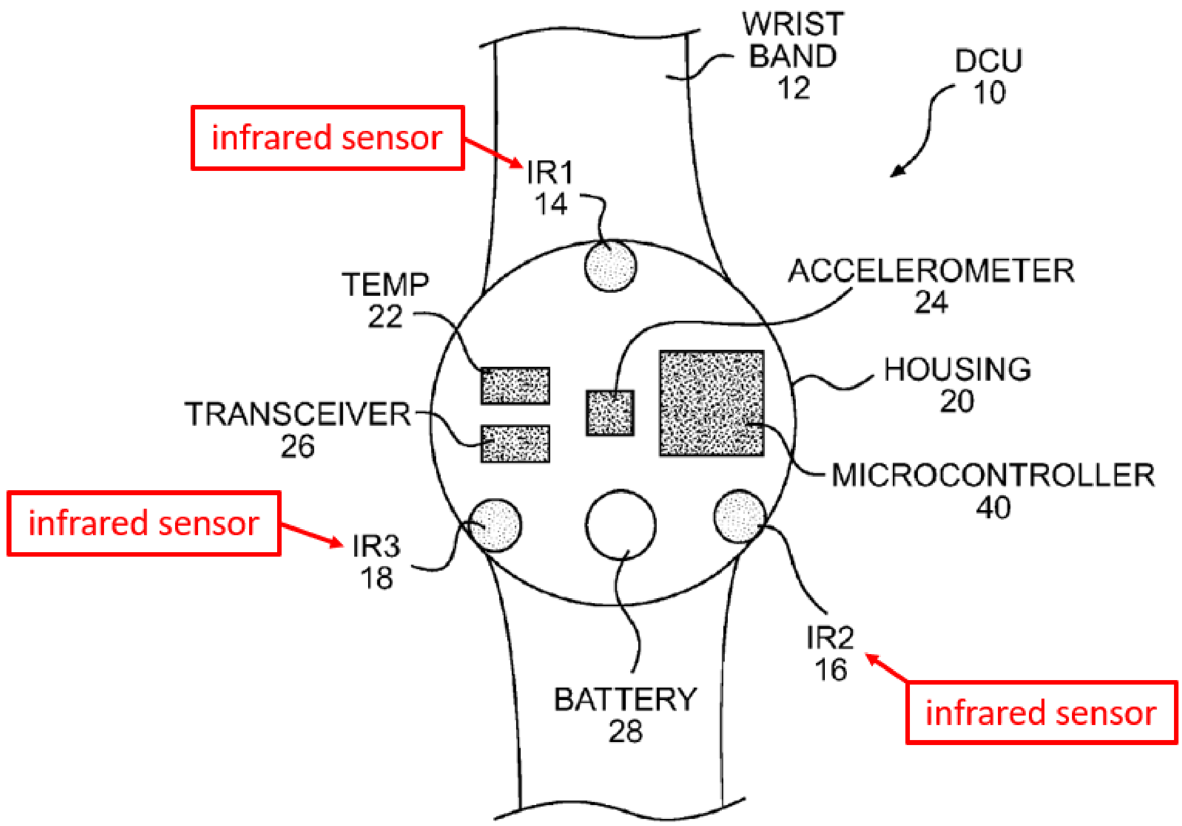




See EX1005 at 26, 27 (Figs. 5, 7).

Based on the construction and evidence provided above in § II(F)(1) (e.g., glass is "usually considered a subset of ceramics." EX1044 at 11; *see* EX1045 at 12), a POSITA would have understood the Kotanagi "cover glass 23" to satisfy this limitation. EX1003 ¶187.

Moreover, the evidence shows a POSITA would have considered glass and ceramic interchangeable. Like Kotanagi, **Kateraas** (EX1014), which published in 2012, describes a biosensing wristwatch:



See EX1014 at 2 (Fig. 1). It teaches that ceramic (which includes sapphire, EX1003 ¶46) can form a "window" of "infrared transmissive or transparent material . . . to allow radiation emitted from infrared sensors 14, 16, and 18" to pass out of the device and "impinge upon the underside of the user's wrist" and allow "infrared radiation reflected or emitted from the user's skin" to pass into the device via the ceramic window. EX1014 at [0059]. "Such infrared transmissive or transparent materials" for the window "may include, e.g., germanium, zinc selenide, **sapphire**, **IR glass**, IR polymer, barium fluoride, calcium fluoride, and combinations thereof . . . ."*Id*. (emphasis added). EX1003 ¶189.

Like Kotanagi and Kateraas, **Yuen** (EX1016),[7] which published in May 2014, describes a biosensing wristwatch ("a heart rate measuring system in the form of a wearable wrist attachable device," *id.* at [0068]). It teaches continuous covers formed from glass or ceramic for optical sensing:

> The heart rate measuring system includes a light source 181 and a reflected light detector 182. . . . **The heart rate monitor location 183 can include a cover** that enables light of the light source to pass while blocking substantially all light in a human visible spectrum. The **cover** can be . . . transparent or translucent **glass** or plastic or . . . **ceramic.**

Id. [0070] (emphases added).

[7] It is not necessary to include Yuen in this combination to render obvious the present limitations. Rather, Yuen is cited here to confirm that a POSITA would have understood that ceramic and glass are interchangeable, and that ceramic covers can form a portion of an exterior surface of a device. In view of this, a POSITA would have understood that Kotanagi's and Honda's cover glass material would have readily formed part of an exterior surface, rendering Claim 1 obvious. EX1003 ¶190 n.5.

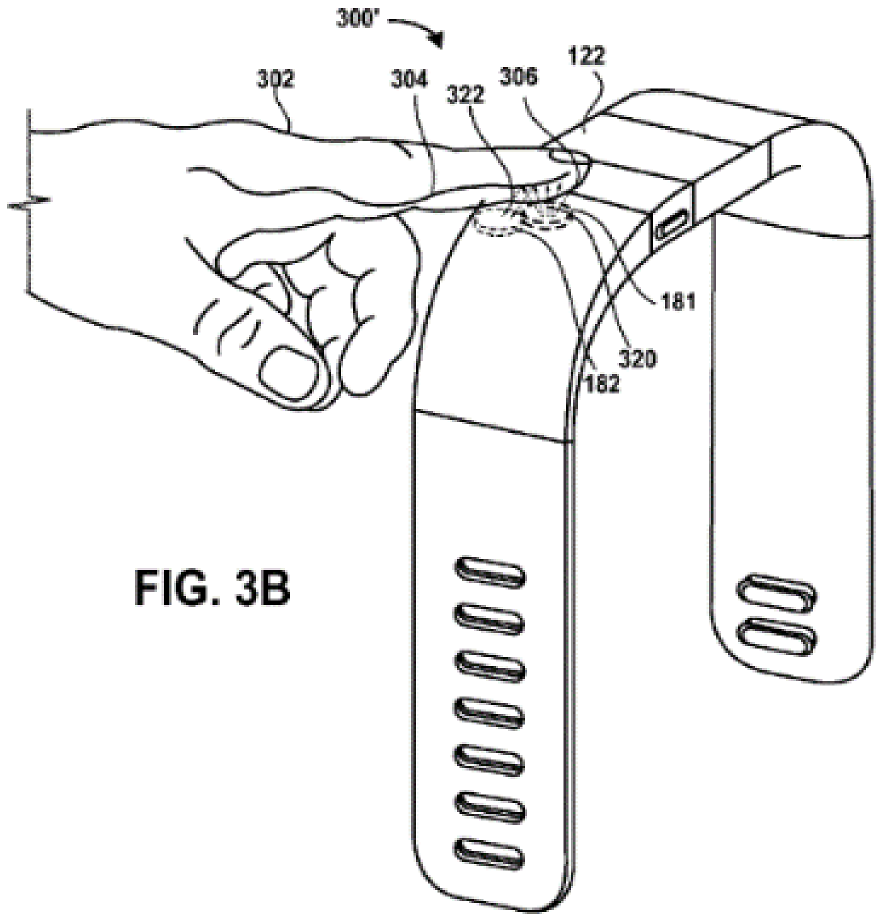


FIG. 3B

Id. at 6 (Fig. 3B).

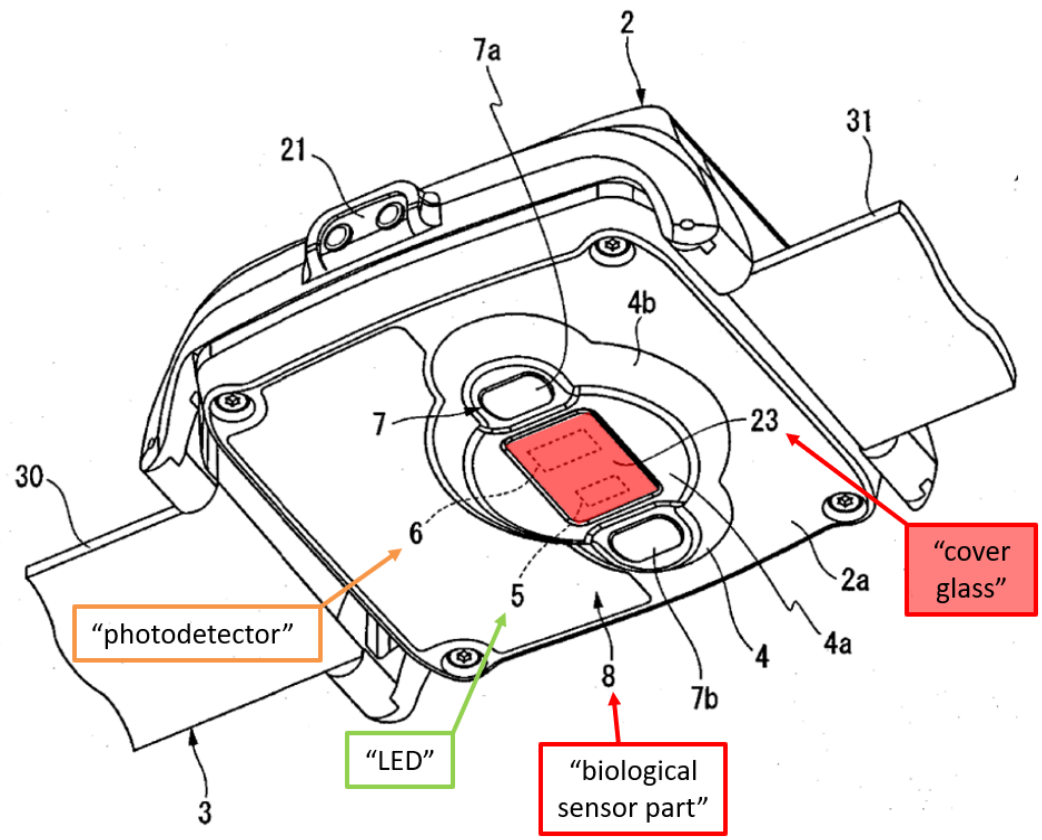
Ceramics literature teaches that ceramics are inorganic, non-metallic, solid materials. EX1043 at 9; EX1045 at 7; EX1044 at 13; EX1046 at 14; EX1049 ¶¶ 41–66 (establishing public accessibility). Sapphire is a ceramic (EX1042 at 13, 15), and glass is "usually considered a subset of ceramics." EX1044 at 11; *see* EX1045 at 12. Based on all the above evidence, a POSITA would have known that glass is substitutable for another ceramic material, as they are closely related. EX1003 ¶¶45–49.

Thus, Kotanagi's "cover glass" would have rendered obvious the "ceramic"

cover of Claim 1, in view of the teachings above and the knowledge of a POSITA.

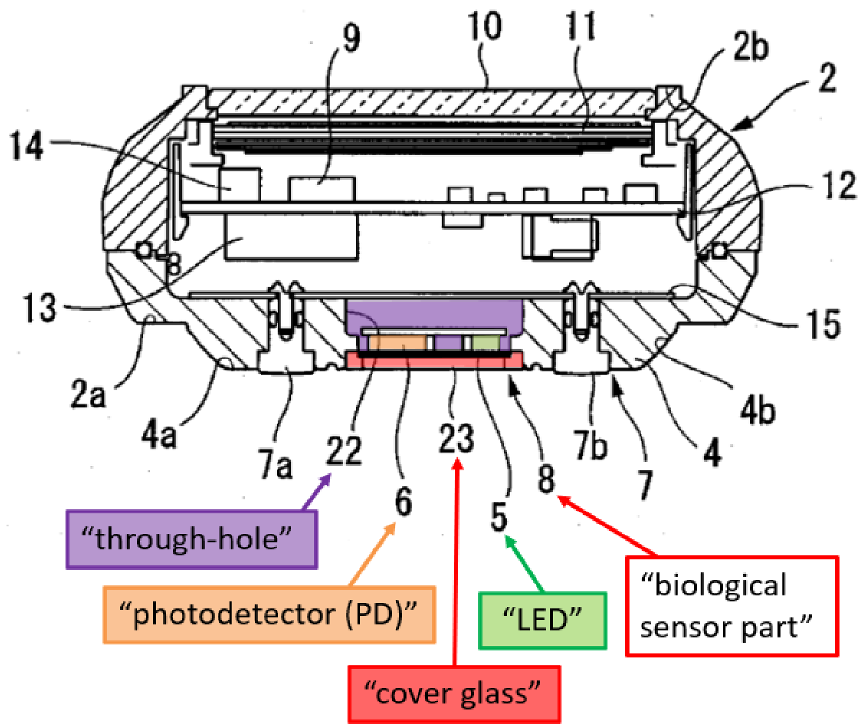
d. "a biosensor module disposed within the second opening below the ceramic cover; and"

Kotanagi teaches a biosensor, as illustrated in its Figure 5:



See EX1005 at 26 (Fig. 5).

Kotanagi further explains its "cover glass 23" in the context of Figure 7: "a cover glass 23 is fixed to the housing 2 so as to block the through-hole 22. The LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the ***inside*** of the glass cover 23." *Id.* ¶(0055) (emphasis added).



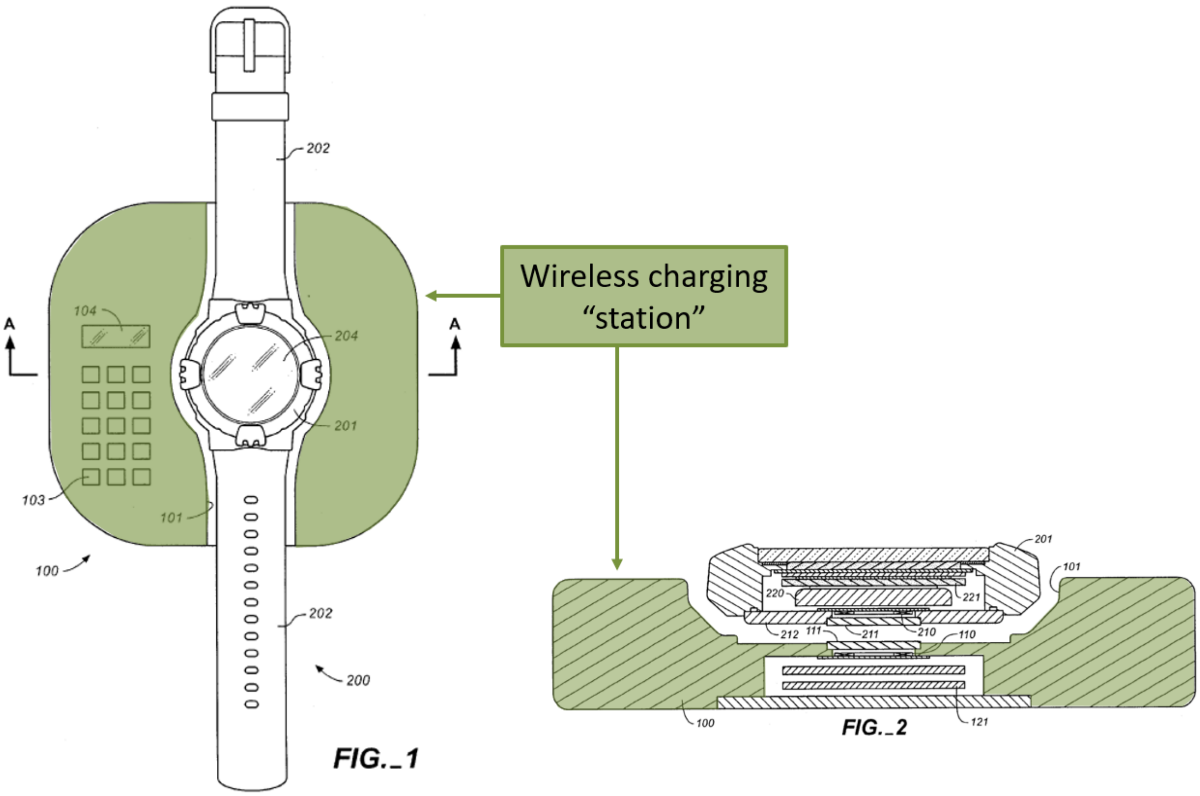
See id. at 27 (Fig. 7). From the above, a POSITA would have understood that Kotanagi teaches these claim limitations. EX1003 ¶194.

e. "a wireless charging receive coil aligned with the second opening and below the ceramic cover;"

Kotanagi teaches that "a transformer or the like for supplying power to a recharger and to the inside of the housing 2 may be provided ***so as to recharge the rechargeable battery 13 in a contactless state***." EX1005 at ¶(0053) (emphasis added). A POSITA would have known at the time of the '783 Patent's invention that transformers use coils and that such contactless charging involves a wireless charging receive coil. EX1003 ¶195.

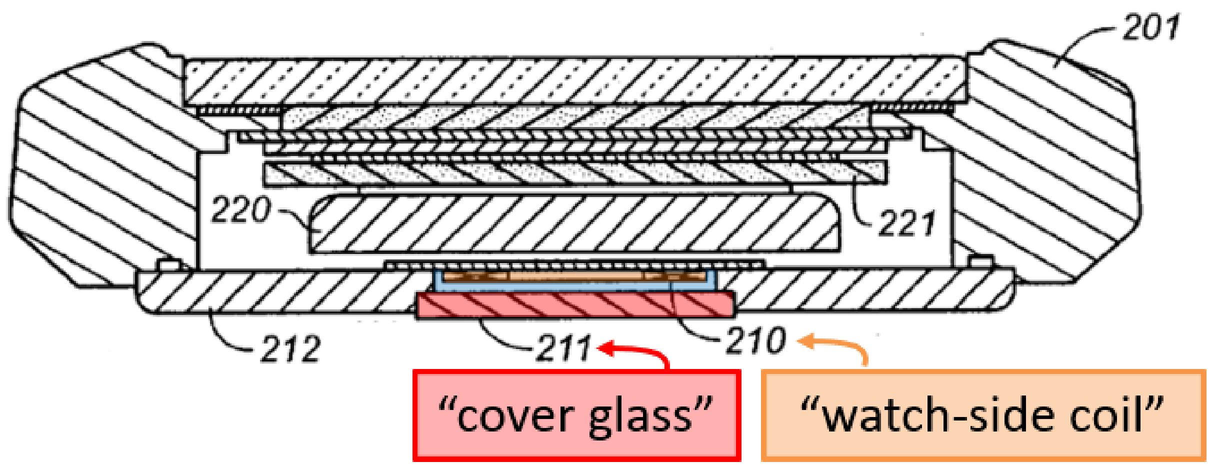
Honda, which issued in 2001, discloses such a contactless charging system

for a biosensing wristwatch. Honda's Figure 1 shows a plan view of the watch in a charging station, with Figure 2 showing a cross-section of this arrangement:

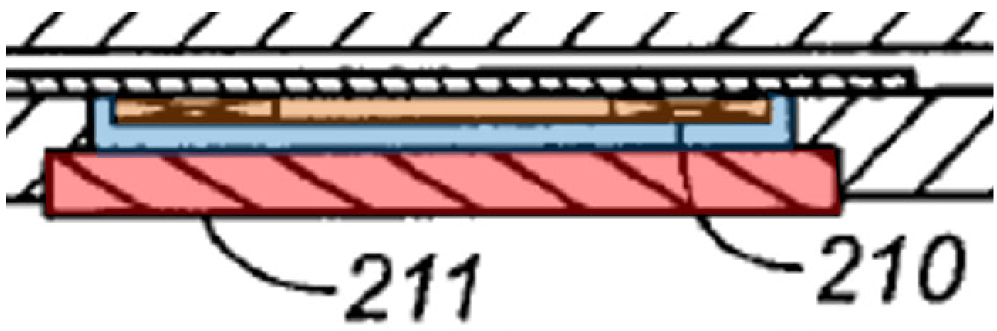


See EX1006 at 2–3 (Figs. 1, 2).

Like Kotanagi, Honda teaches a biosensor: "the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–20. Like Kotanagi, the Honda watch has a "cover glass" over an opening in the bottom face of the watch. *Id.* at 6:24–25. Behind this is a charging coil: "[A] watch-side coil 210 for the data transmission and the battery charging is arranged in a case back 212 of the watch body 201 and is covered with a cover glass 211." *Id.* 6:22–25.



See EX1006 at 3 (Fig. 2). The following shows a close-up view confirming that Honda's watch-side coil is "aligned with the opening," as claimed:



See id.

f. "wherein: the ceramic cover is configured to pass optical signals generated by the biosensor module; and

This limitation is obvious for the reasons provided in section IV(A)(1)(e). Moreover, Kateraas' ceramic cover is configured to pass optical signals: "Such **infrared transmissive or transparent** materials for window 103 may include, e.g., germanium, zinc selenide, sapphire, IR glass, . . ."[8] EX1014 [0059].

[8] Yuen also teaches an optical transmissive cover, showing this was

Accordingly, Kotanagi alone, or Kotanagi as modified by Kateraas, teaches the "ceramic cover" "configured to pass optical signals generated by the biosensor module" as claimed.

g. "the ceramic cover is configured to pass wireless power from an external wireless charging device to the wireless charging receive coil."

This limitation is obvious for the reasons provided in section IV(A)(1)(f). Based on the above, Claim 1 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 1 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

h. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda, and would have had a reasonable expectation of success in doing so. A POSITA would have been further motivated to combine Kateraas (in the same field of biosensing watches) because Kotanagi explains its goal that "light can be emitted and received efficiently, and biological information can be detected with high precision." EX1005 ¶(0089). Kateraas helps fulfill this goal by teaching

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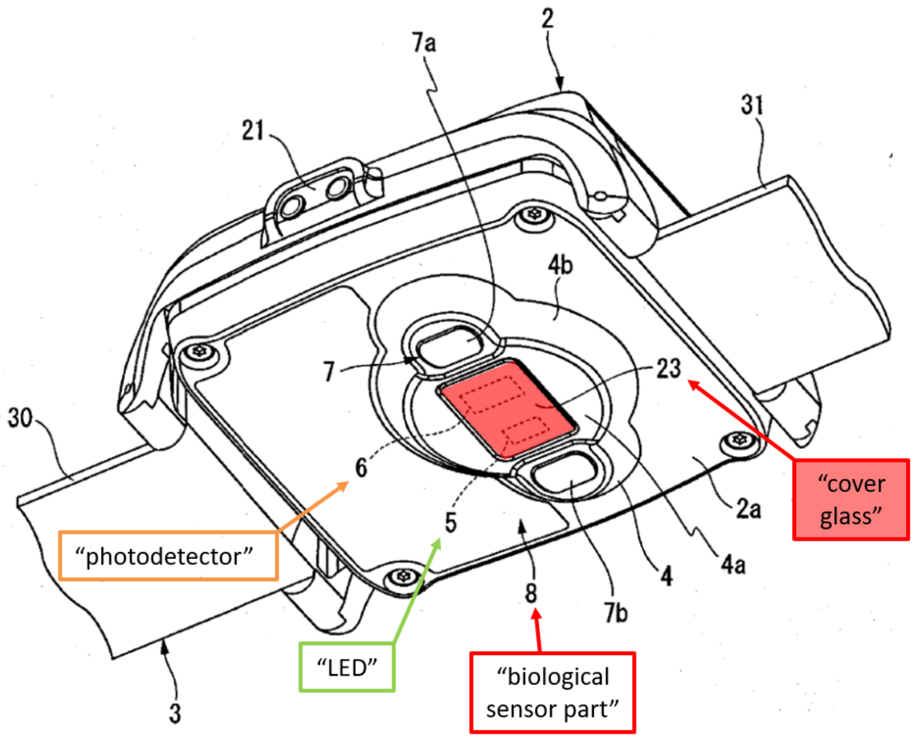
common in the art prior to the filing of the '783 patent. EX1016 [0070]; EX1003 ¶199 n.6.

specific window materials that are "infrared transmissive or transparent . . . to allow radiation emitted from infrared sensors 14, 16, and 18 to pass out of housing 101" and allow "infrared radiation reflected or emitted from the user's skin to pass into housing 101 via window 103." EX1014 [0059]. Thus, a POSITA would have found it obvious to substitute those specific window materials (e.g., sapphire, zinc selenide, germanium, barium fluoride, or calcium fluoride) for Kotanagi's or Honda's cover glass. EX1003 ¶204.

This motivation to combine also applies to the other Ground 3 combinations and dependents from Claim 1. EX1003 ¶205. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 2

Claim 2 depends from Claim 1 and adds "**wherein the biosensor module comprises: a light source configured to emit light toward a region of skin of the user; and a detector configured to receive light reflected from the region of skin**." Kotanagi teaches the limitations of Claim 2:



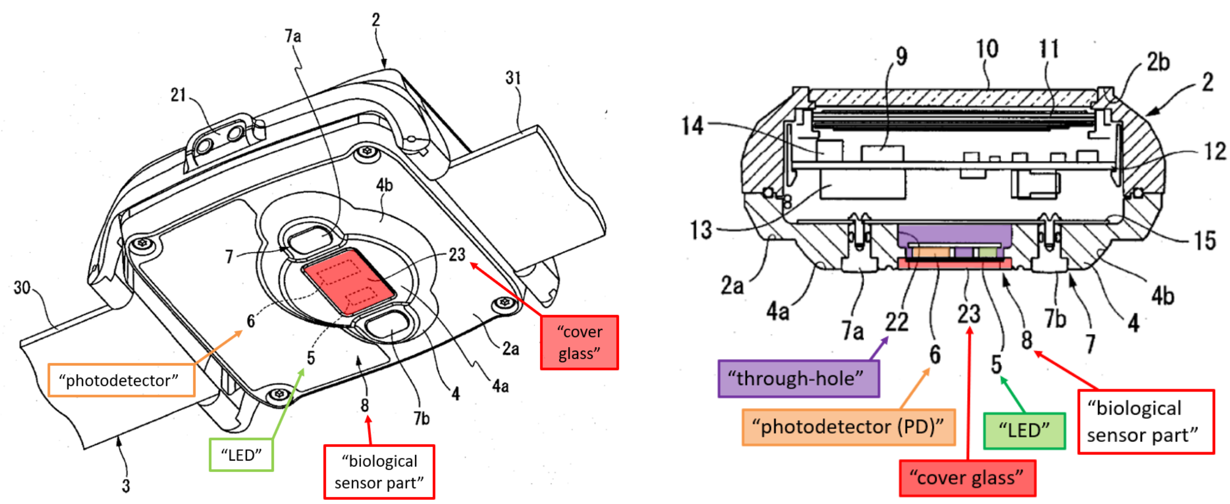
See EX1005 at 26 (Fig. 5). These features are "configured" in the claimed manner because both are positioned in a protrusion at the base of the device, for contacting a user's wrist: "LED (Light Emitting Diode) (light-emitting part) 5 for emitting light toward the living body" and "PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body." EX1005 ¶(0046). EX.1003 ¶¶210–211.

Based on the above, Claim 2 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 2 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

3. Dependent Claim 3

Claim 3 depends from Claim 1 and adds "**the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin**."

Similar to the '783 patent and consistent with the claim construction provided in § II(F)(3) above, Kotanagi teaches a single opening in its base spanned by a single cover glass, with an LED and a photodetector both positioned in that opening immediately behind the cover glass such that light can travel through the cover glass to and from these features:



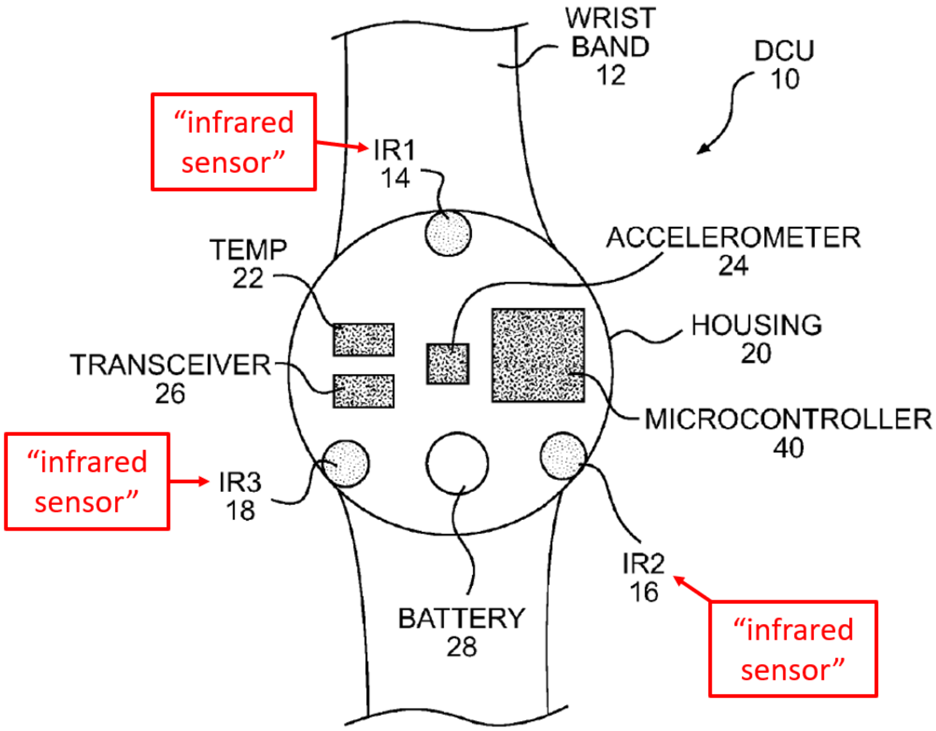
See EX1005 at 26, 27 (Figs. 5, 7).

Kotanagi's cover glass covers the rear opening, thereby spanning more than the surface areas shown for both the LED and photodetector and providing operational access to them by allowing light to pass through. Kotanagi's cover glass therefore defines the openings as claimed.

If this claim is interpreted such that there must be two *separate* apertures, the two areas surrounded by dashed lines in Kotanagi's Figure 5 would suggest to a POSITA that two separate windows could be used in those areas. Kotanagi's larger opening is functionally equivalent to the claimed two openings, because it is large enough to accommodate both the transmission and reception of light; creation of two openings instead of one would create no new and unexpected result.[9] EX1003 ¶211.

Moreover, Kateraas teaches an "array" of separate sensors. EX1014 [0012] ("infrared sensors 14, 16, and 18; and/or temperature sensor 22 (and any combinations thereof) may be integrated together to form a sensor array").

[9] *See In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) (mere duplication of parts has no patentable significance unless a new and unexpected result is produced.).



See EX1014 at 2 (Fig. 1).

The sensors in the array can be "embedded directly into" the material of a window, thus establishing a specific opening or window for each sensor. EX1014 [0058]–[0059] ("one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material"). EX1003 ¶213.

Thus, a POSITA would have understood, either from Kotanagi alone or from Kotanagi and Kateraas, the limitations of Claim 3.

Based on the above, Claim 3 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 3 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

4. Dependent Claim 4

Claim 4 depends from Claim 2 and adds "**the light source and the detector are configured to measure changes in light absorption by the region of skin; the electronic device is configured to compute a health metric using the measured change in light absorption; and the display is configured to display information associated with the health metric**."

Kotanagi teaches this. The watch of Kotanagi:

> …emits light from the LED 5 toward the living body. A portion of the emitted light is absorbed, for example, by hemoglobin in blood vessels, and another portion of the light is reflected by biological tissue. The PD 6 receives this reflected light, generates a pulse signal (biological information signal) corresponding to the amount of received light, and outputs the signal to the data processing part 9.

EX1005 ¶(0065). A POSITA would have understood from Kotanagi that reduction of local hemoglobin increases relative amounts of reflection (because other biological tissue does not absorb as much). EX1003 ¶217. This teaches the claimed measurement of "changes in light absorption by the region of skin." Kotanagi expressly teaches that this generates a "pulse signal (biological information signal)," satisfying the claimed computation of a "health metric." EX1005 ¶(0046). After Kotanagi's "data processing part" "analyzes the signal to detect the pulse rate," it "displays the signal on the display part 11." *Id.* at ¶(0066).

> A cover glass 10 with a substantially square shape is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 **for displaying the aforementioned pulse rate** that is detected and various other information is disposed inside the cover glass 10.

EX1005 ¶(0048) (emphasis added). This teaches the claimed "display" that is "configured to display information associated with the health metric." EX1003 ¶217.

Kateraas also teaches the limitations of dependent Claim 4, while expressly disclosing the ceramic cover of independent Claim 1. It teaches the light source and detector for health metric output:

> In the exemplary embodiment shown in FIG.1, data collection unit 10 includes three infrared sensors 14, 16, 18. . . . Each infrared sensor may be configured as a transmitter/receiver capable of monitoring the oxygen content of blood passing through nearby blood vessels.

EX1014 [0043]. As discussed above (e.g., in § IV(A)(6)), Kateraas teaches displaying a health metric. *Id*. Moreover, as noted with respect to Claim 1 above, Kateraas expressly teaches using a ceramic window:

> Housing 101 may include a window 103, fabricated from an infrared transmissive or transparent material, for example, to allow radiation emitted from infrared sensors 14, 16, and 18 to pass out of housing 101 and impinge upon the underside of the user's wrist. In turn, window 103 also allows infrared radiation reflected or emitted

> from the user's skin to pass into housing 101 via window 103. Such infrared transmissive or transparent materials for window 103 may include, e.g., germanium, zinc selenide, sapphire, IR glass, IR polymer, barium fluoride, calcium fluoride, and combinations thereof.
>
> . . .

EX1014 [0059]. EX1003 ¶218.

Based on the above, Claim 4 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 4 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

5. Dependent Claim 5

Claim 5 depends from Claim 2 and adds "**wherein the light source and the detectors are configured to operate as a photoplethysmogram (PPG) sensor**."

The term "detectors" (plural) appears to be a typo in Claim 5 because Claims 1 and 2 both refer to a single "detector." Accordingly, Claim 5 is limited to a single detector. Moreover, adding more than one detector would not affect patentability because multi-detector devices are well known (see, e.g., the three infrared sensors 14, 16, and 18 in Kateraas, EX1014 [0014], Fig. 1).

A plethysmograph measures changes in volume within an organ or body, typically from air or blood fluctuations. A photoplethysmogram (PPG) sensor uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. *See* EX1003 ¶¶222. Thus, a PPG sensor measures

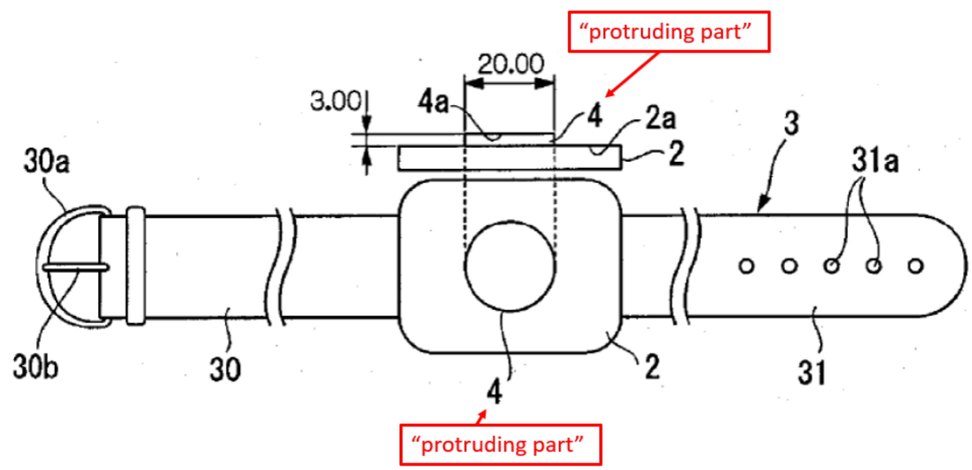
changes in light absorption by a skin region that are specifically caused by volumetric variations of blood circulation. A typical PPG relies on this same biological principle: hemoglobin in blood absorbs certain wavelengths, and that is how the Kotanagi and Kateraas optical sensors operate to determine pulse rate, etc. EX1005 ¶(0065); EX1014 [0016]. EX1003 ¶222.

Accordingly, the evidence provided above for dependent Claim 4 also applies to Claim 5.

Based on the above, Claim 5 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 5 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

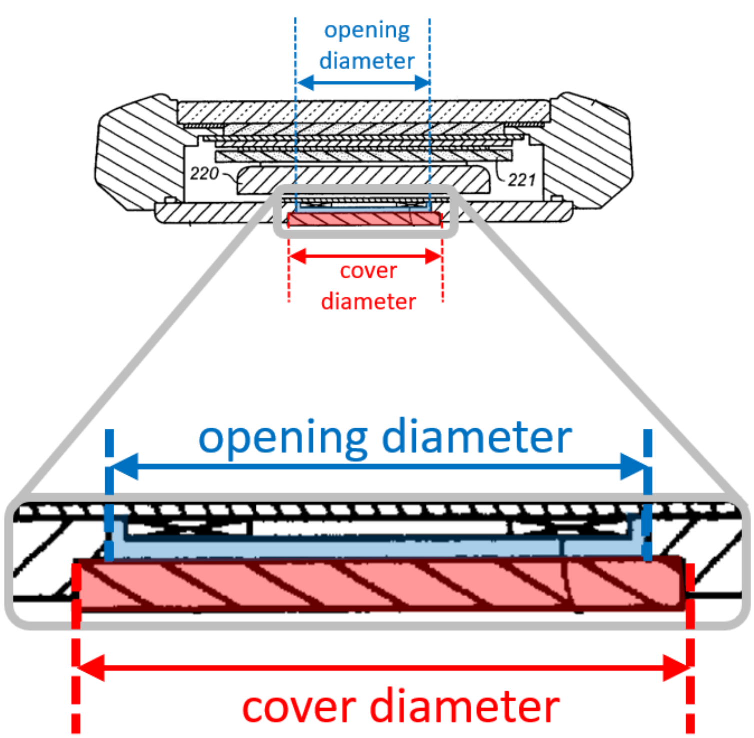
6. Dependent Claim 6.

Claim 6 depends from Claim 1 and adds "**wherein: the ceramic cover is a disk having a disk diameter that is greater than an opening diameter of the second opening; and the ceramic cover forms a water-tight seal with the housing along a perimeter of the ceramic cover**." Kotanagi teaches a protruding disk in its Figure 8, for example: "For example, as illustrated in FIG. 8, the protruding part 4 may be formed so that the outer periphery is circular." *See* EX1005 ¶(0076) .

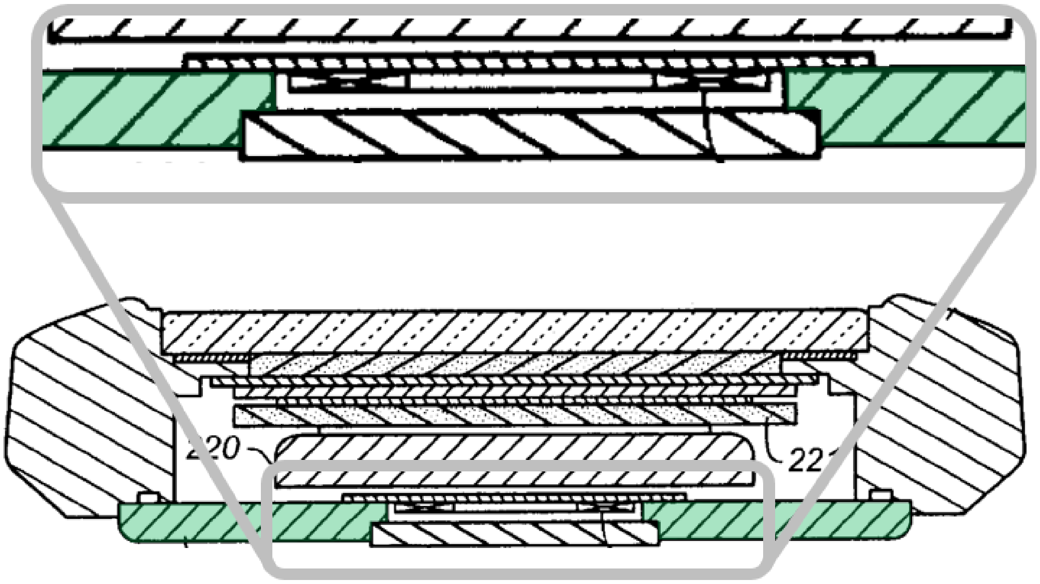


Id. at 16 (Fig. 8). This disk covers the opening and therefore has at least the same diameter, if not a larger diameter, than the opening. However, Kotanagi does not specifically state that this disk is a ceramic cover forming a water-tight seal.

In the same field of endeavor Honda teaches a cover with a diameter that is "greater than an opening diameter of the second opening":



See EX1006 at 3 (Fig. 2). The claimed diaimeter differences are also demonstrated by the notch in the housing for seating the window, as highlighted here:



See id.

One of the reasons motivating Honda's wireless charging invention is a need for stronger "waterproofness":

> If the charging and the signal transmission are performed through electrical contacts in such a system, the contacts are exposed and the apparatus is **weak in terms of waterproofness**. **For this reason**, the charging and the signal transmission are preferably performed in a non-contact fashion, through the electromagnetic coupling between coils respectively arranged in the station and the portable electronic apparatus.

EX1006 1:24–31. Honda additionally teaches, "**By arranging a high-rigidity glass on the surface** to which the primary coil and the secondary coil face, **a**

compact and waterproof electronic apparatus is provided." *Id.* at 15:36–38 (emphases added). Honda further teaches its watch is waterproof up to five atmospheres. *Id*. 13:22–25.

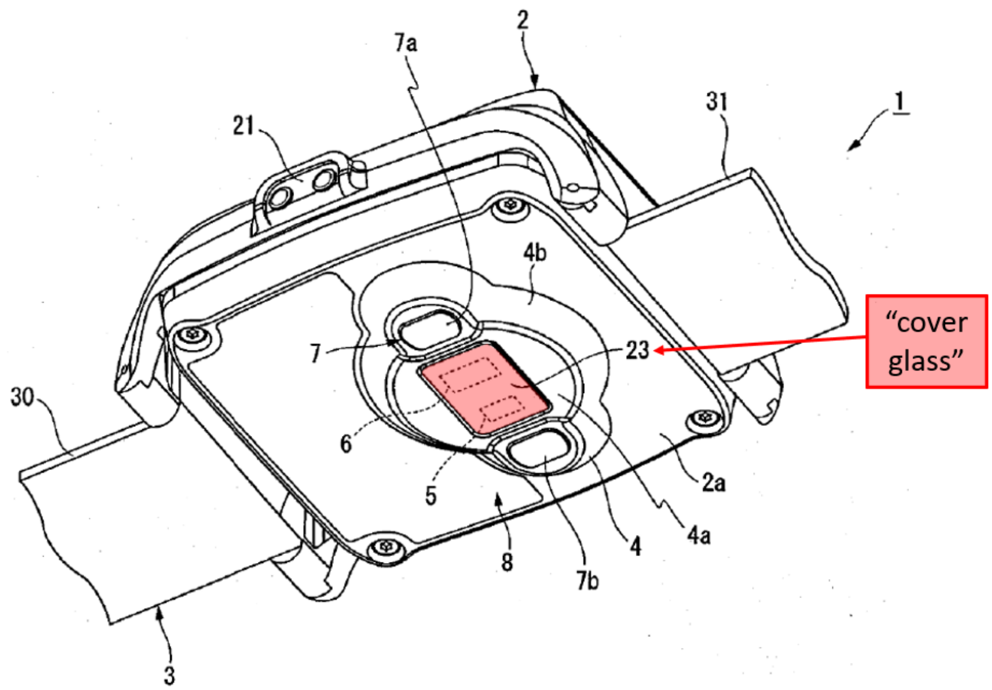
From the above, the relative sizes of the opening and disk, and the notched arrangement shown above, a POSITA would have understood that the Honda cover forms "a water-tight seal with the housing along a perimeter of the ceramic cover" as claimed. A POSITA would expect to successfully achieve a water-tight seal (and be motivated to establish such a seal) based on the general knowledge of watches successfully using sealants, rubber gaskets, etc. to prevent moisture from harming internal electrical components, allowing watch wearers to wash hands, swim, etc.

Based on the above, Claim 6 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 6 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

7. Dependent Claim 7

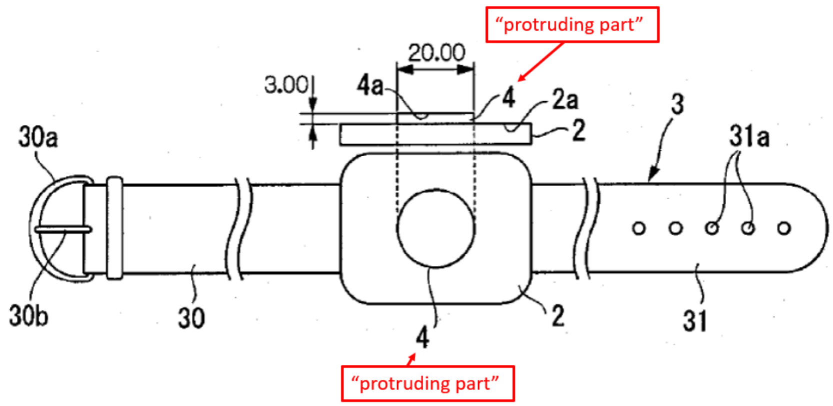
Claim 7 depends from Claim 1 and adds "**wherein: the second opening has an opening diameter; the wireless charging receive coil has a coil diameter that is less than the opening diameter; and the wireless charging receive coil is configured to receive the wireless power through the second opening**."

As noted above, Kotanagi teaches a second opening with a cover glass. In some figures, Kotanagi illustrates the opening and cover with a roughly rectangular shape, with rounded corners.



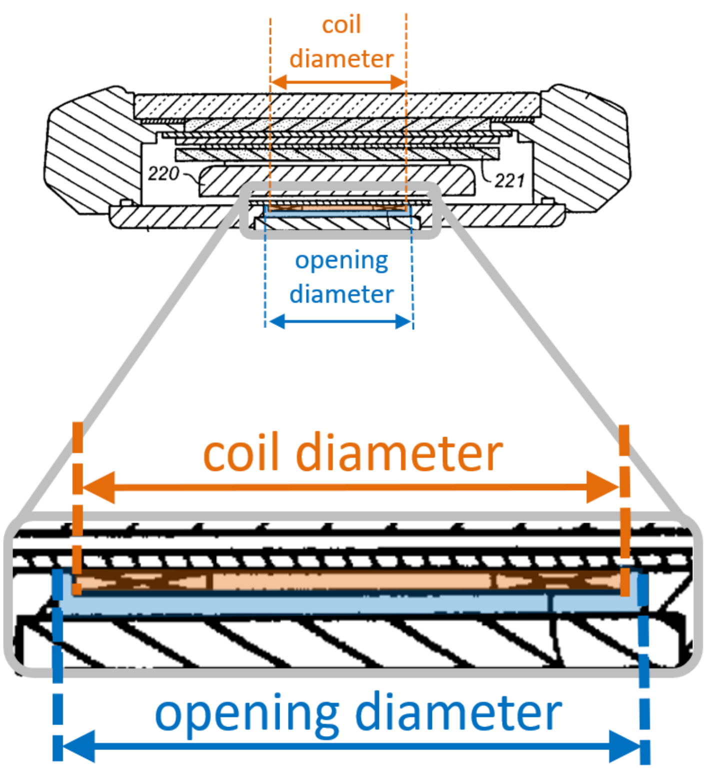
See EX1005 at 26 (Fig. 5).

Although the "cover glass" in the Kotanagi figures above is not circular, Kotanagi also teaches a protruding disk in its Figure 8: "the protruding part 4 may be formed so that the outer periphery is circular" and Kotanagi describes its diameter: "the diameter of the protruding part 4 illustrated in FIG. 8 is set to 20 mm." EX1005 ¶(0076).



See id. at 28 (Fig. 8). A POSITA would have understood from the figure above that the underlying opening also has an "opening diameter." EX1003 ¶232.

In the same field of endeavor Honda teaches a wireless charging coil that is aligned with and fits within (thus having a smaller diameter than) a second opening:



See EX1006 at 3 (Fig. 2). Honda thus teaches that the wireless charging receive coil is configured to receive wireless power through the second opening. In Honda, this power comes from a "station-side coil 110" (*id*. at 6:28):

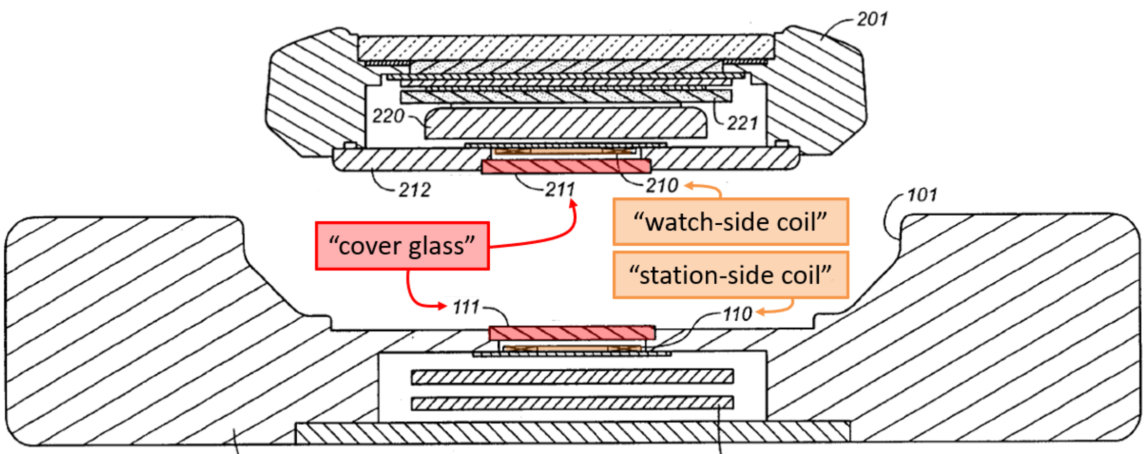


FIG._2

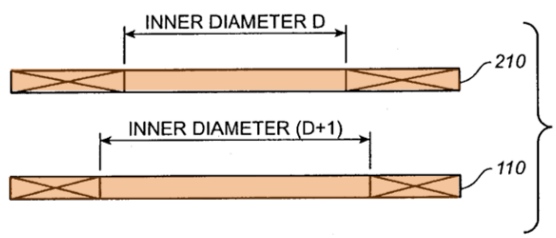


FIG._3

See id. at 3 (Figs. 2, 3).

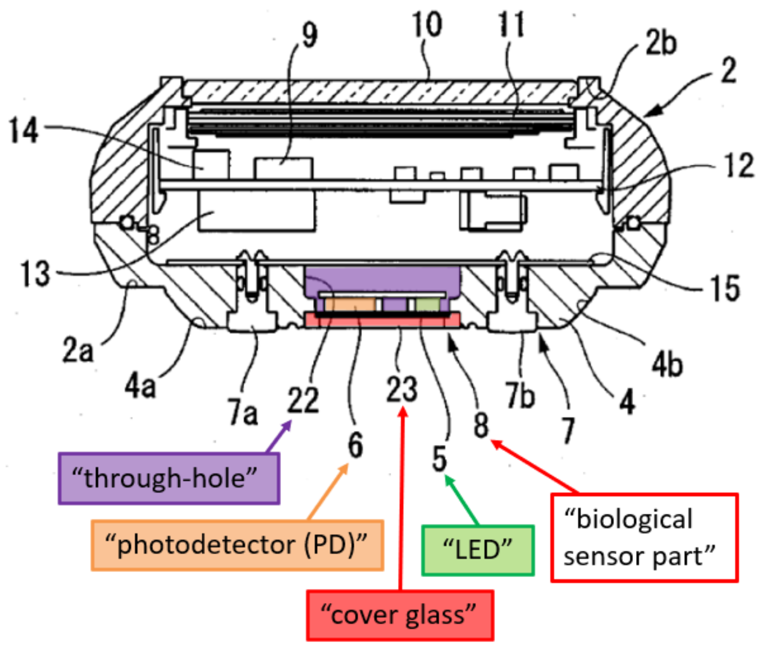
Based on the above, Claim 7 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 7 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

8. Dependent Claim 14

Claim 14 depends from Claim 9 and adds "**the biosensor module includes an array of optical components; and the cover includes an array of windows,**

each window aligned with a corresponding optical component of the array of optical components."

As discussed herein with respect to Claim 3, Kotanagi teaches a single opening in its base, with a single cover glass, and an LED and a photodetector both positioned in that opening immediately behind the cover glass:

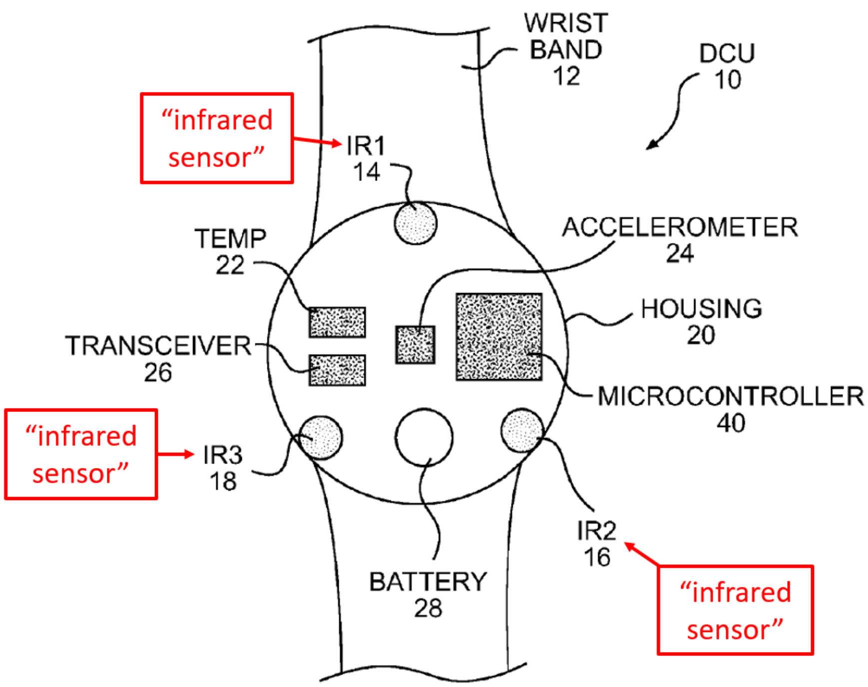


See EX1005 at 27 (Fig. 7).

Kotanagi's cover glass fills the single large opening, thereby spanning more than the surface areas shown for both the LED and photodetector and providing operational access to them. Thus, Kotanagi teaches an "array" of two optical components, and a window "aligned with" the corresponding optical components in the array. The two areas surrounded by dashed lines in Kotanagi's Figure 5 would suggest to such a POSITA that two separate windows could be used in those

areas. Kotanagi's larger opening is functionally equivalent to the claimed two openings, because it is large enough to accommodate both the transmission and reception of light to the two optical components; creation of two openings instead of one would create no new and unexpected result.[10] EX1003 ¶238.

Moreover, Kateraas teaches an "array" of separate sensors. EX1014 [0012]. ("[I]nfrared sensors 14, 16, and 18; and/or temperature sensor 22 (and any combinations thereof) may be integrated together to form a sensor array"). *Id.* at [0058].



See EX1014 at 2 (Fig. 1).

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10 *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), *see supra* note 4.

The sensors in the array can be "embedded directly into" the material of a window, thus establishing a specific opening or window for each sensor. EX1014 [0058]–[0059] ("one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material").

Based on the figure above showing three different sensors, embedding these directly into a window material, as taught by Kateraas, specifically aligns each of the sensors with its own separate, corresponding specific opening or window of the window material.

This would not affect charging because, just as in the '783 patent ("the outer surface of the rear cover defines one or more windows" for "operational access to . . . optical components", EX1001 2:65–67), the windows of Kotanagi and Kateraas are likewise defined by a rear cover. EX1005 at 26 (Fig. 5) (dashed lines within cover 23); EX1014 [0059] ("one or more of infrared sensors 14, 16, and/or 18 may be embedded directly into the material of window 103.").

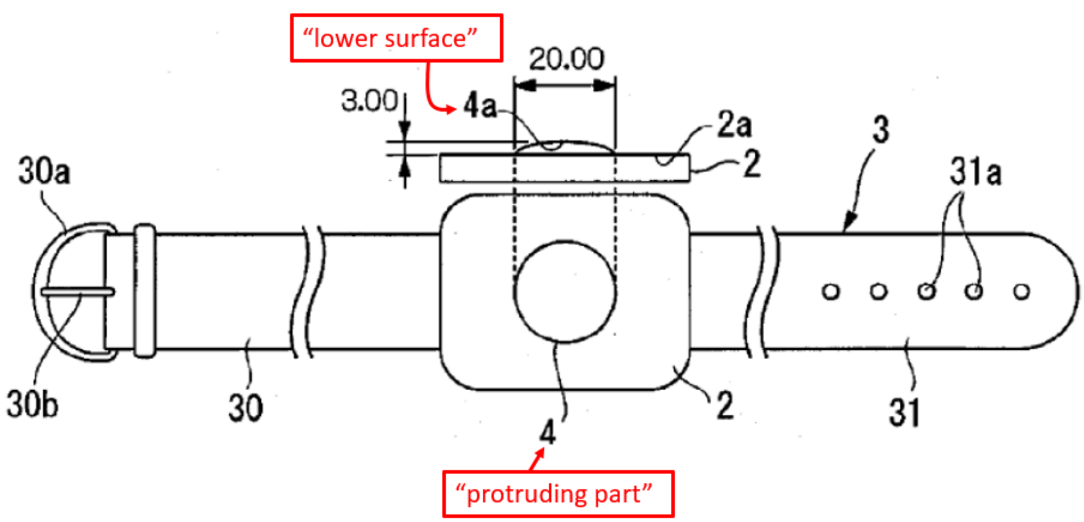
Based on the above, Claim 14 would have been obvious in view of Kotanagi and Honda. Alternatively, Claim 14 would have been obvious in view of Kotanagi and Honda, combined with Kateraas.

D. Ground 4: Claims 12–13 and 17–18 are unpatentable because they would have been obvious in view of Kotanagi, Honda, Jabori, and optionally, in further combination with Park

1. Dependent Claim 12

Claim 12 depends from Claim 9 and adds "**the cover is a disk having a convex shape that protrudes away from the housing; and the convex shape is configured to facilitate alignment with a concave surface of an external inductive power transmitter dock**." Claim 9 states that the cover is "disposed over the biosensor module" and passes optical signals.

Kotanagi's Figure 10 shows a disk-shaped protruding part with a convex shape that protrudes away from the housing: "Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10." EX1005 ¶(0080).



See id. at 28 (Fig. 8). Kotanagi elsewhere includes a cover glass within a

"protruding part 4." EX1005 ¶(0055). A POSITA would have understood from Kotanagi's Figure 10 that the entire protruding part can form a convex "cover glass" that spans the through-hole 22. *Id.* at 28. As noted above, Kotanagi also teaches wireless charging, or charging "in a contactless state" (EX1005 ¶(0053)). This would have motivated a POSITA to look to Honda for modifications to make for such wireless charging. EX1003 ¶244.

Honda teaches an external inductive power transmitter dock which it terms a "station." EX1006 *passim*. Honda also teaches using complementary shapes to facilitate alignment for charging. EX1006 at 2–3. Thus, a POSITA would have known from Honda to accommodate Kotanagi's convex protrusion in a slightly modified version of Honda's wireless charging station. This modification would have been relatively simple, since Honda's station already demonstrates the concept of using concave surfaces to accommodate convex surfaces of a device to be charged. Honda explains how socket shape can be "slightly larger" to assist with alignment for charging:

> FIG. 1 is a plan view . . . . [A]n electronic watch 200 is seated in a socket 101 of a station 100 . . . . Since the socket 101 is shaped to be slightly larger than a body 201 of and a band 202 of the electronic watch 200, the watch body 201 is seated in alignment in the station 100.

EX1006 6:4–11.

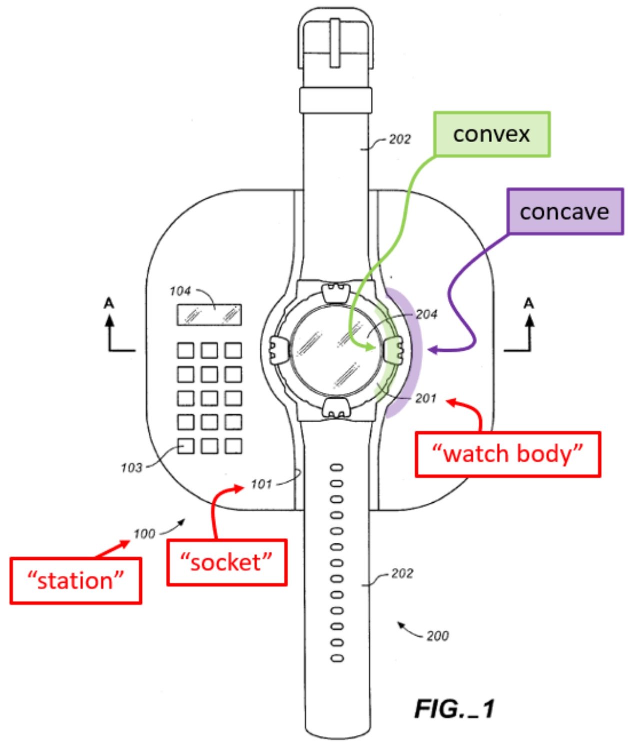


FIG._1

Id. at 2 (Fig. 1). Similar to the complementary concavity shown above, Honda's cross section view shows complementary convex and concave surfaces to facilitate alignment in a charging station:

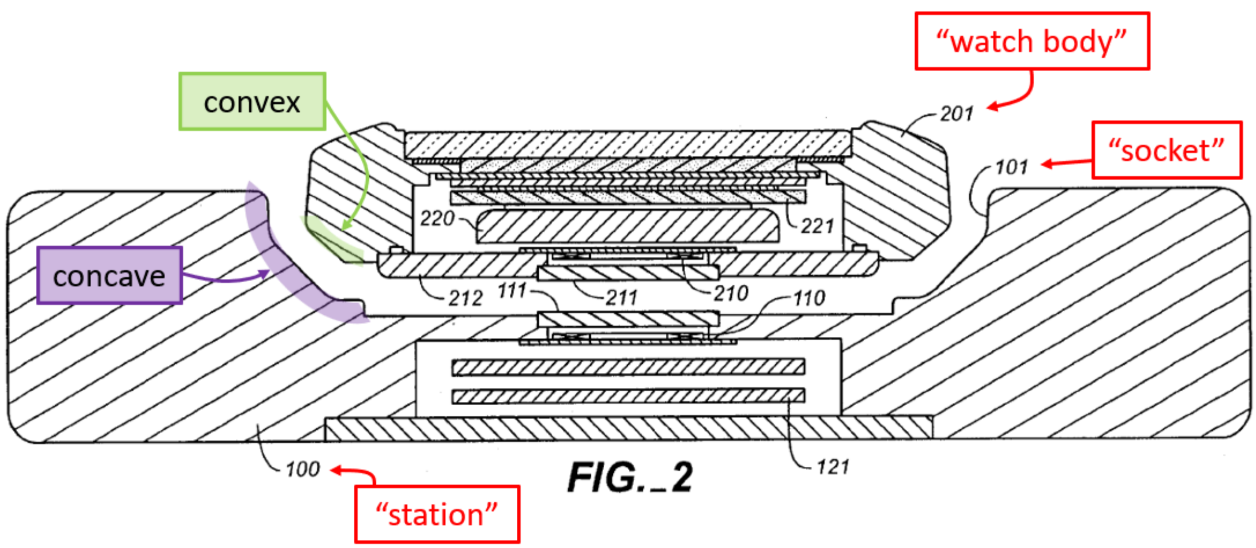
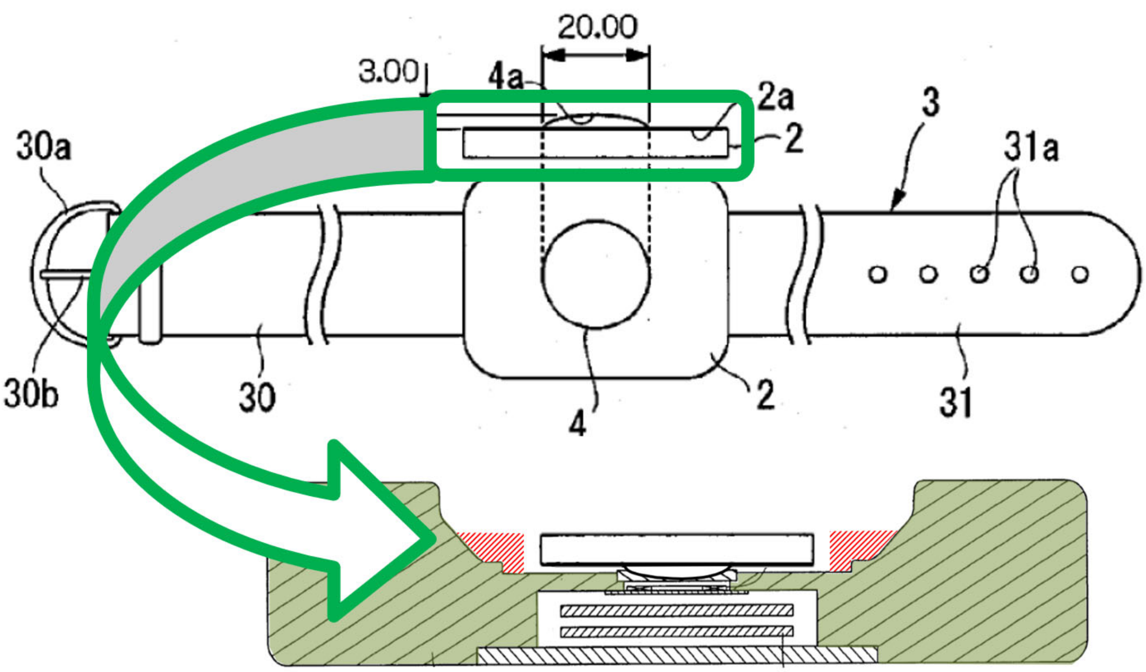


FIG._2

See id. at 3 (Fig. 2). A POSITA would have understood from these teachings that

the Kotanagi embodiment having a convex protruding cover should be provided a complementary concavity in the charging station, so the socket can be "shaped to be slightly larger than" the device being charged. *Id*. at 6:9. EX1003 ¶245. This is illustrated below:



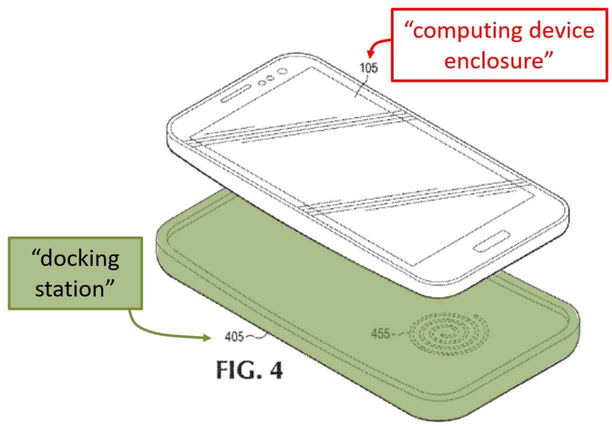
See EX1005 at 28 (Fig. 8), EX1006 at 3 (Fig. 2) (annotation of Kotanagi's watch in a modified version of Honda's station).

A POSITA would have readily made these modifications based on the teachings of Kotanagi and Honda. For example, a POSITA would have known from Honda to maintain a distance between transmitter-side and receiver-side coils of approximately 3 to 5 mm (or less) (see Honda's discussion of Fig. 14 showing transmission efficiency as a function of distance—EX1006 13:3–32), and therefore

provided a concavity for the convex protrustion if the receive-side coil is located behind it. EX1003 ¶246.

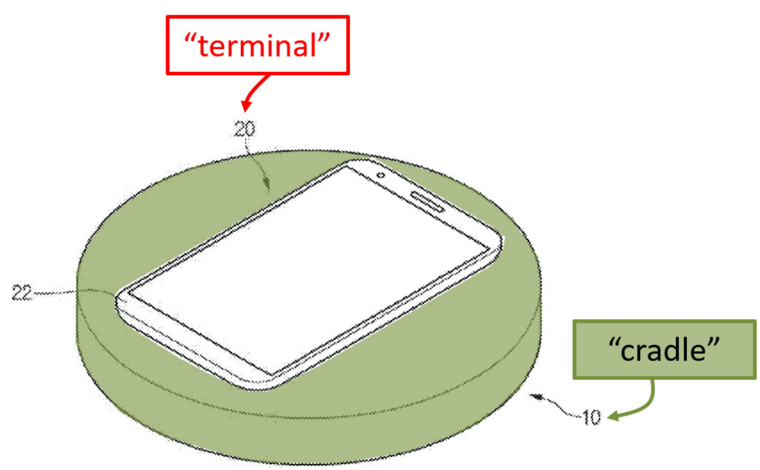
Further, **Jabori** teaches in a similar context that convex / concave shapes promote alignment for wireless power transmission:

> FIG. 4-5 are a computing device and wireless power transmitter according to example implementation. In some examples the enclosure 105 and a docking station 405 may have a **shape that promotes the alignment** caused by the haptic modules to align the wireless power transmitter 455 with the wireless power module 130. One example of such a shape is the computing device enclosure 105 has a **convex** shape and the docking station 405 includes **concave** shape.



EX1017 [0017]; *see id*. at [0013].

Moreover, **Park** teaches that for wireless charging stations (where a cradle can hold and charge a wireless power receiving apparatus, or



"terminal"), "At least a portion of the top of the cradle 10 may have the same shape as the back of the terminal 20." EX1012 [0102]; EX1015 at 18; *see* EX1012 at 4; EX1015 at 43. A POSITA would have considered this teaching to support the modifications illustrated above for alignment and charging when the device has a convex cover. EX1003 ¶¶248–249.

Based on the above, Claim 12 would have been obvious over Kotanagi, Honda, and Jabori. Alternatively, Claim 12 would have been obvious over Kotanagi, Honda and Jabori, further in view of Park.

a. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda, and had a reasonable expectation of success in doing so. For example, they both teach wireless charging and biosensing of a pulse signal and are analogous art.

A POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi, Honda, Park, and Jabori, because Honda teaches that alignment of the wireless charging coils is "required to be accurate" and that misalignment of the wireless charging coils reduces or modifies the magnetic flux of the wireless charging field. EX1006 1:53–59. EX1003 ¶252.

A POSITA would have looked to Park and Jabori as they both teach methods for aligning wireless charging devices, and a POSITA would have found their teachings obviously substitutable with those found in Honda. EX1003 ¶253; 254–255.

This motivation to combine also applies to the other Ground 4 combinations and dependents from Claim 12. EX1003 ¶256. Further motivations to combine are provided throughout this petition.

2. Dependent Claim 13

Claim 13 depends from Claim 12 and adds "**the wearable electronic device is magnetically coupled to the external inductive power transmitter dock through the cover and the biosensor module**."

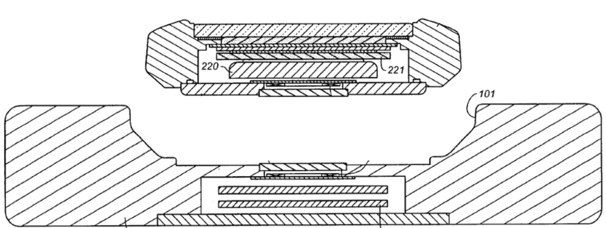
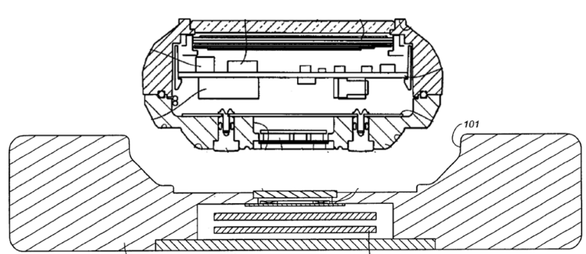
These limitations are obvious for the reasons provided in section IV(B)(1) with respect to Park's magnetic alignment. This claim adds the device is coupled "through the cover and the biosensor module." In Kotanagi as modified by Honda, as discussed with respect to Claim 11 above, power is transmitted through the cover glass (which also supports Kotanagi's LED and photodetector). Honda thus teaches that magnetic induction causes coupling "through" these structures.

Based on the above, Claim 13 would have been obvious over Kotanagi and Honda. Alternatively, Claim 13 would have been obvious over Kotanagi and Honda, combined with Park.

3. Dependent Claim 17

Claim 17 depends from Claim 15 and adds "**the wireless charging receive coil is configured to receive power from an external inductive power transmitter dock; the electronic watch defines a convex contoured surface along the bottom portion; and the convex contoured surface is configured to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock**."

A POSITA would have known that Kotanagi's recharging in a "contactless state" (EX1005 ¶(0053)) involves a wireless charging receive coil that receives power from an external inductive power transmitter dock. This would have suggested modifying Kotanagi to include Honda's coil (*see supra* § IV(A)(4), discussing Claim 15). Consistent with Honda's teaching to align by seating a watch in a station "socket" (EX1006 6:7), a POSITA would also have readily used Honda's charging station (or something similar), with Kotanagi's watch, as shown in the figures below. EX1003 ¶264.

Honda's watch, with Honda's station (*see* EX1006 at 3):	Kotanagi's watch, with Honda's station (*see* EX1006 at 3, EX1005 at 27):
 FIG._2	 FIG._2

After addressing any potential scale differences, a POSITA would have readily combined Kotanagi and Honda at least because the figures suggest complementary shapes. Thus, Honda and Kotanagi teach a charging dock and facilitating alignment as claimed. EX1003 ¶264.

As shown above for Claim 12, Honda's charging station (EX1006 at 2–3) has "concave contoured" surfaces and uses these complementary shapes for charging alignment. Example concave or near-concave surfaces in Honda's wireless charging station are shown here, where Honda's watch body is correspondingly convex or near-convex.

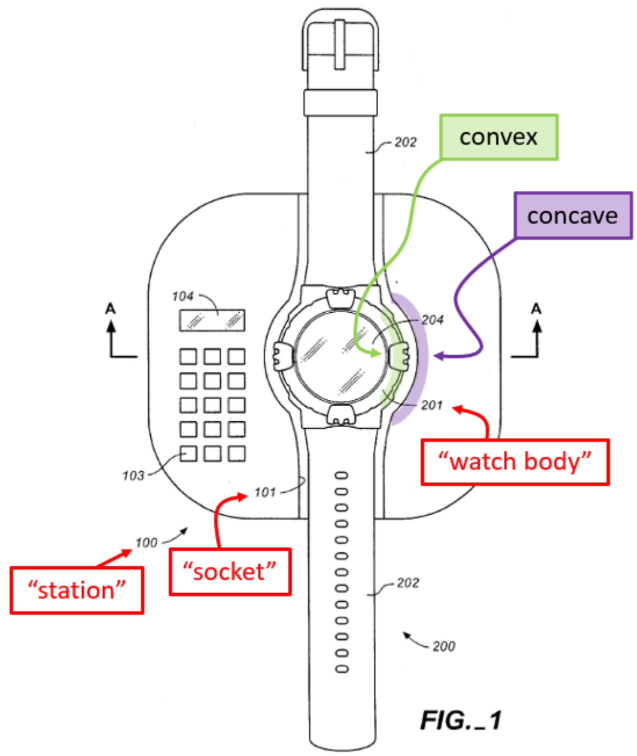


FIG._1

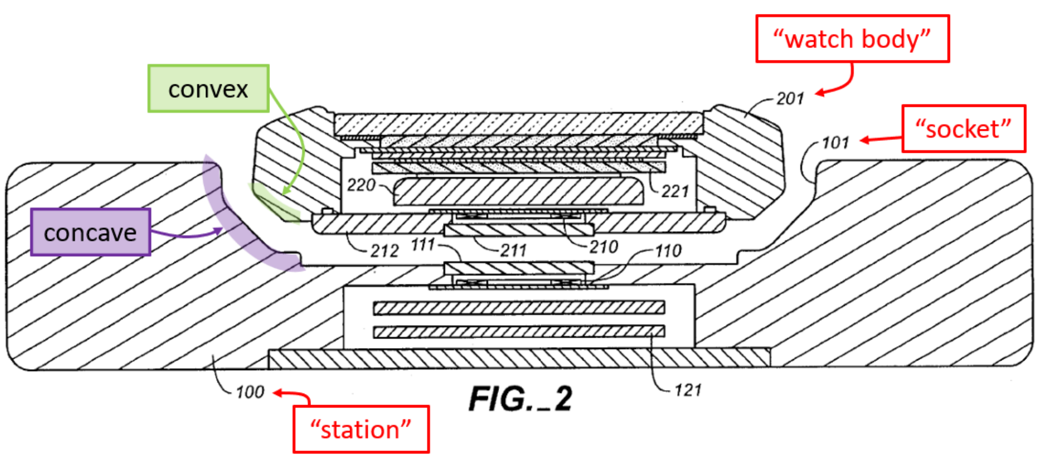


FIG._2

See EX1006 at 2–3.

Figure 2 shows two different convex or near-convex contoured surfaces "along the bottom portion" of Honda's watch, one to the right, and one to the left. Although Honda's watch has a central flattened portion between these two sides, the complementary shapes and rounded edges in these figures would have suggested to a POSITA that a complimentary concave charging socket can be used to align a convex device. EX1003 ¶266.

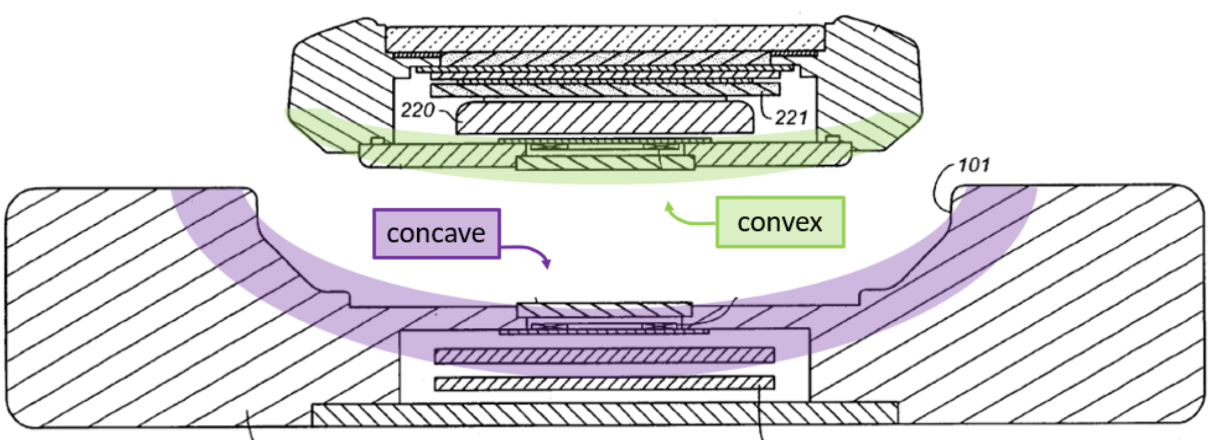
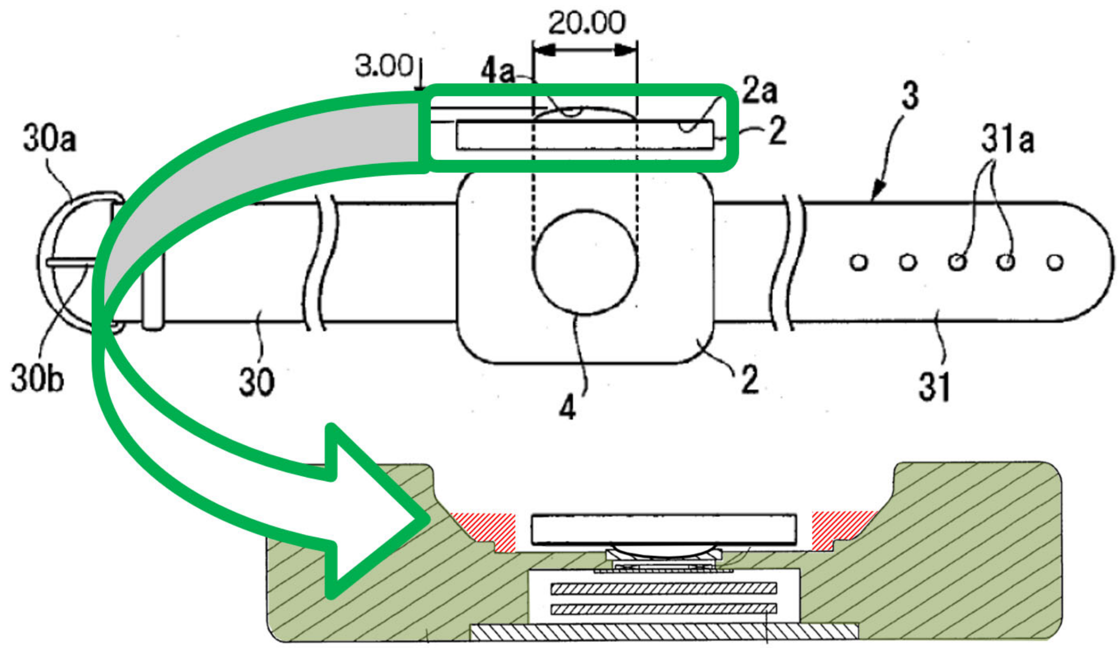


FIG._2

See id. at 3 (Fig. 2).

Kotanagi's Figure 10 teaches an electronic watch that "defines a convex contoured surface along the bottom portion" as claimed (EX1005 ¶(0080)), and consistent with the above discussion of Claim 12, a POSITA would have understood to use the Kotanagi watch's convex contoured surface "to facilitate alignment with a concave contoured surface of the external inductive power transmitter dock," as claimed, at least based on Honda's statement that the socket

can be "shaped to be slightly larger than" the device being charged. *Id.* 6:9. EX1003 ¶267.



See EX1005 at 28 (Fig. 8); EX1006 at 3 (Fig. 2) (shape modification added).

A POSITA would have readily made these modifications based on the teachings of Kotanagi and Honda. For example, a POSITA would have known from Honda to maintain a distance between transmitter-side and receiver-side coils of approximately 3 to 5 mm (or less) (see Honda's discussion of Fig. 14, EX1006 13:3–13), and therefore provided a concavity for the convex protrustion where the receive-side coil is located behind it. EX1003 ¶268.

Further, **Jabori** teaches shapes for wireless power transmission that promote alignment, describing a device with a "convex shape" and a docking station with a "concave shape." *See* EX1017 [0017].

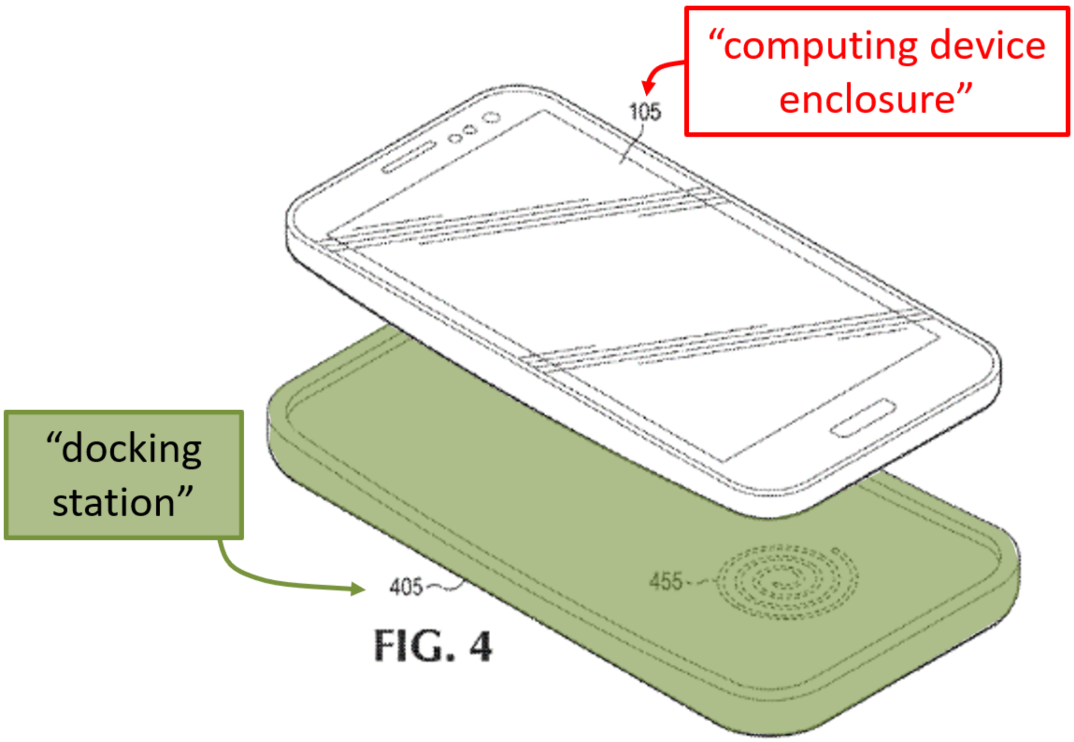


FIG. 4

See EX1017 at 16 (Fig. 4).

From this, a POSITA would have understood to further modify the combination of Kotanagi and Honda to be convex/concave. EX1003 ¶269.

This is further supported by **Park**, which teaches facilitating alignment with a cradle that "may have the same shape" as the device being charged. EX1012 [0102]; EX1015 at 18.

Based on the above, Claim 17 would have been obvious in view of Kotanagi, Honda, and Jabori. Alternatively, Claim 17 would have been obvious in view of Kotanagi, Honda, and Jabori, combined with Park.

4. Dependent Claim 18

Claim 18 depends from Claim 17 and adds "**wherein the convex contoured**

surface is configured to protrude toward a portion of skin of the user when the electronic watch is worn."

As discussed for example with respect to claims 12 and 17, Kotanagi, Honda, and Jabori teach protruding convex surfaces. *See supra* §§ IV(D)(1) and (3). Kotanagi's "protruding part 4" (e.g., Fig. 10, EX1005 at 28) protrudes toward a user's skin. When mounted to a wrist, the protrusion "facilitates contact between the living body surface and the lower surface of the protruding part." *Id.* ¶94. Likewise, Honda's watch is configured to be "fastened to a wrist of a user" to "detect biological information." EX1006 6:15–20. Accordingly, Kotanagi alone, or as modified by Honda, teaches these limitations and Claim 18 would have been obvious over Kotanagi and Honda.

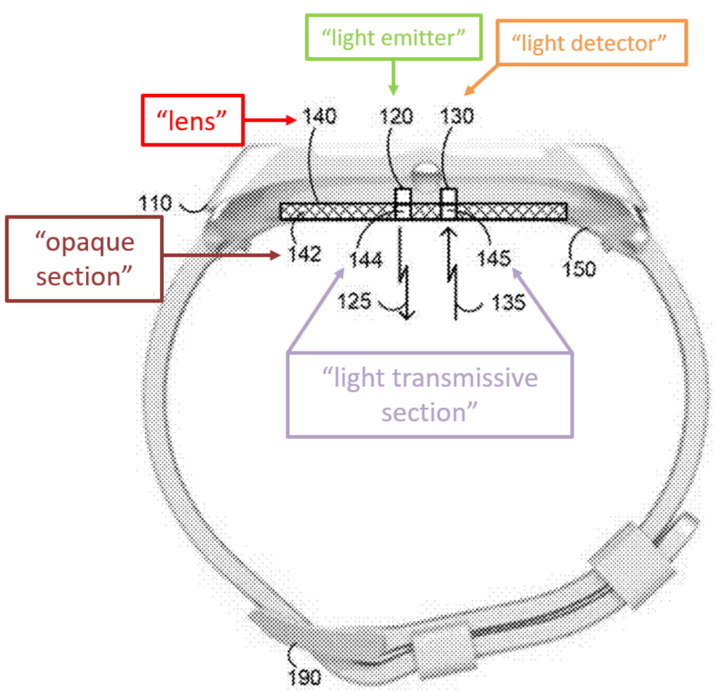
Further, **Jabori** teaches a device with an outwardly protruding "convex shape." *See* EX1017 [0017]. Thus, alternatively, Claim 18 would have been obvious over Kotanagi, Honda, in further view of Jabori.

E. Ground 5: Claims 3 and 14 are unpatentable because they would have been obvious in view of Kotanagi, Honda, Kateraas, and Fraser

1. Dependent Claim 3

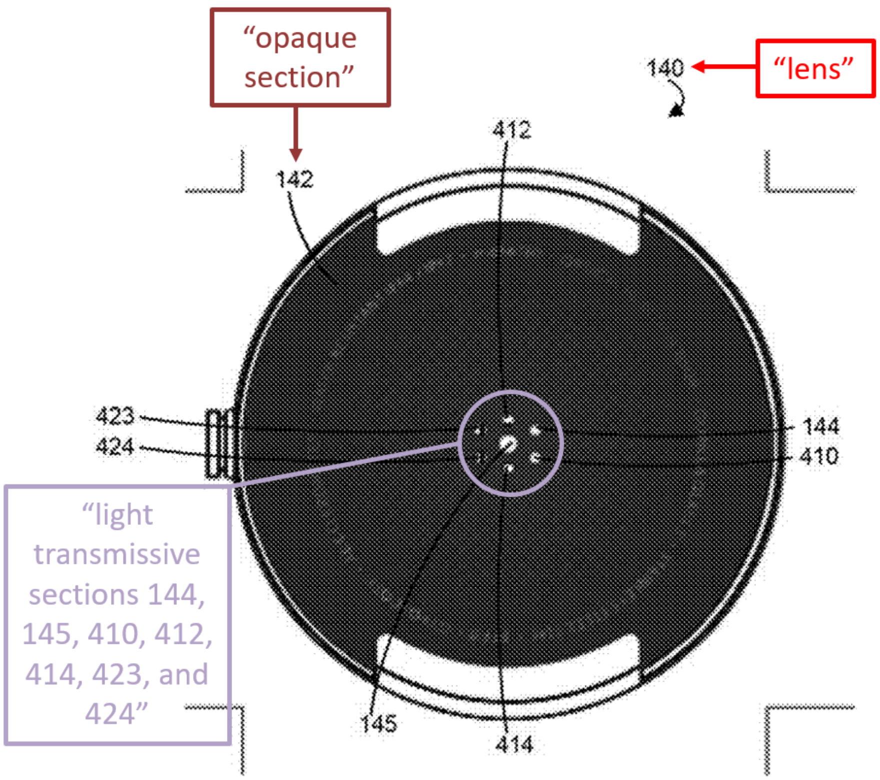
Claim 3 depends from Claim 1 and adds "**the ceramic cover defines a first opening to transmit the light from the light source; and the ceramic cover defines a second opening to receive the light reflected from the region of skin**."

The analysis of Ground 3, Claim 3 applies here, adding Fraser to further teach the cover openings for light transmission (emission and reception). Fraser's array of "light transmissive sections 144, 410, 412, 414, 423, and 424" can "transmit light from the light emitters 120, 322, 324, 326 of FIG.3 and other light emitters." EX1041 at [0027]. In this figure, arrow 125 shows light emission:



Id. at 2 (Fig. 1).

Fraser also teaches that "light transmissive section 145 can transmit light reflected from a user to the light detector 130 of FIG. 3." *Id*. at [0027]. In the figure above, light coming in is shown with arrow 135. Fraser's "light transmissive sections" can be "etched, molded, drilled, [or] laser cut" into—forming "apertures" in—an opaque lens. *Id*. at [0018].

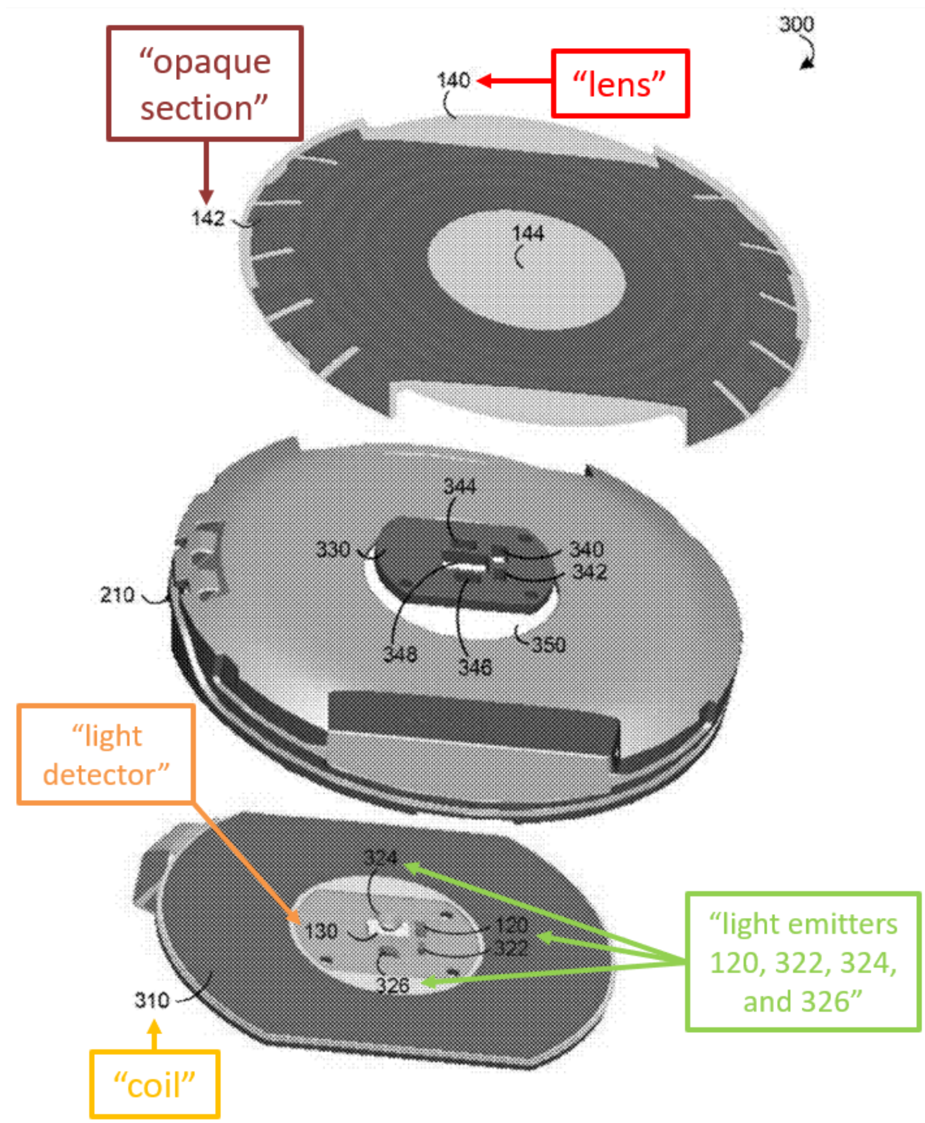


See id. at 5 (Fig. 4).

Thus, Fraser teaches the claimed cover openings for light transmission (emission and reception). EX1003 ¶¶275–278.

a. Motivation to Combine

It would have been obvious to combine Kotanagi and Fraser for various reasons. For example, both teach optical biosensing and contactless/wireless charging, and they are analogous art. EX1005 at ¶(0053), EX1041 at [0026]. Fraser's light emitters are surrounded by a wireless charging coil, as shown below:



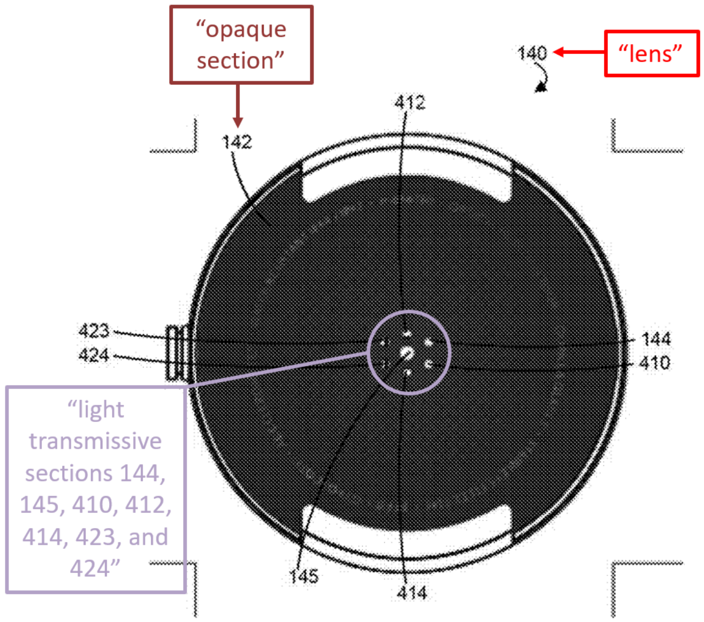
See EX1041 at 4 (Fig. 3).

Moreover, Fraser teaches that a watch may employ "light transmissive sections to focus emitted and received light." EX1041 at [0029]. Because Kotanagi's watch is intended to emit and receive light, a POSITA would have looked to Fraser for how to focus or guide the light and would have modified Kotanagi's structure with a reasonable expectation of success. This motivation also applies to Claim 14, below. EX1003 ¶¶280–281.

2. Dependent Claim 14

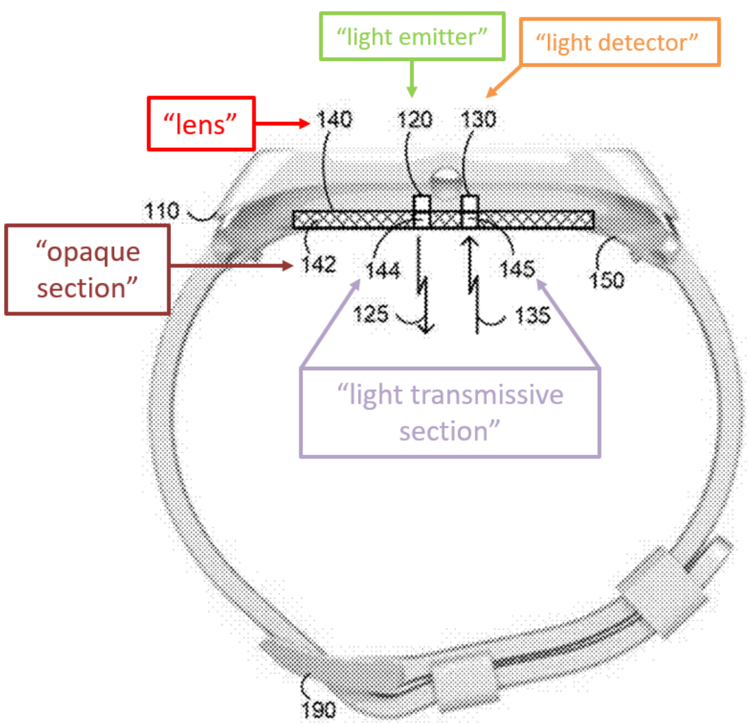
Claim 14 depends from Claim 9 and adds "**the biosensor module includes an array of optical components; and the cover includes an array of windows, each window aligned with a corresponding optical component of the array of optical components.**"

The analysis of Ground 3, Claim 14 applies here, except Fraser is used instead of Kateraas to teach an array of windows aligned with an array of optical components. Fraser's "light transmissive sections 144, 410, 412, 414, 423, and 424" form an array. EX1003 ¶283.



See EX1041 at 5 (Fig. 4).

The light transmissive sections are "aligned" (e.g., with emitter 120 and detector 130) as shown below, to perform their transmission function:

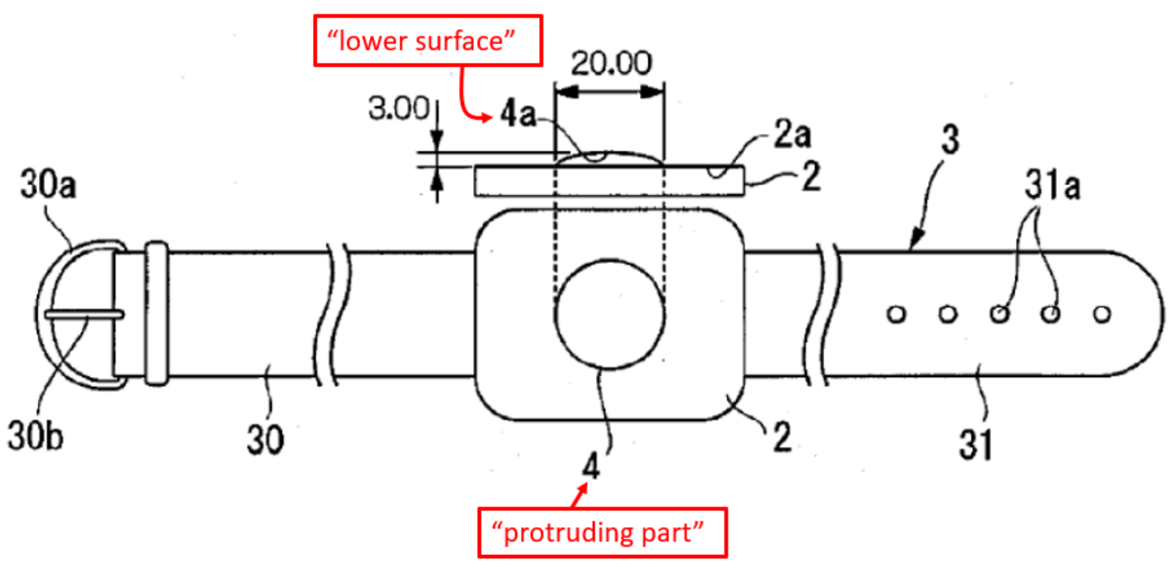


See EX1041 at 2 (Fig. 1).

F. Ground 6: Claim 8 is unpatentable because it would have been obvious in view of Kotanagi, Honda, Jabori, and optionally, in further combination with Kateraas and/or Park

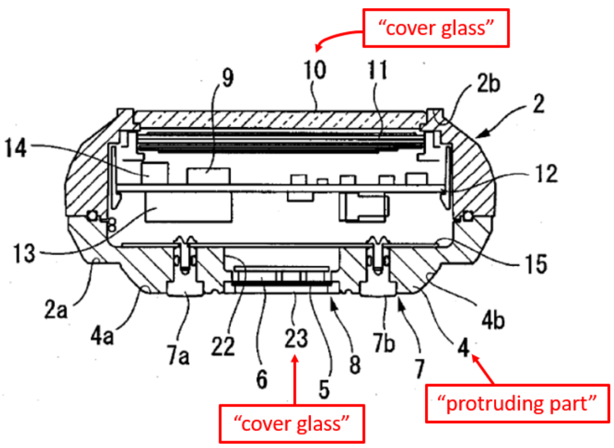
Claim 8 depends from Claim 1 and adds "**wherein: the ceramic cover has a convex contoured shape that protrudes toward the user; and the convex contoured shape facilitates alignment between the ceramic cover and a mating surface of the external wireless charging device**."

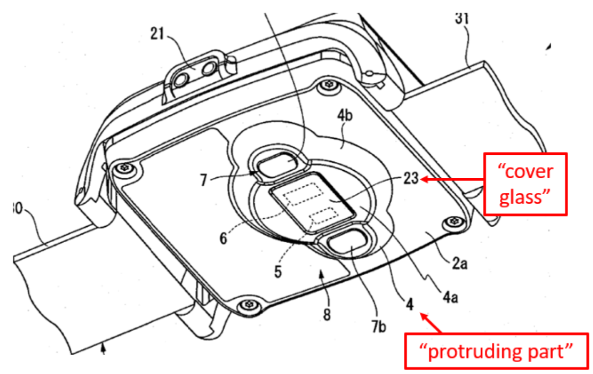
Kotanagi's Figure 10 shows a protruding part with a convex contoured shape that protrudes toward the user:



See EX1005 at 28 (Fig. 8); EX1005 ¶(0080).

Kotanagi does not specify many details of this protruding part. However, Kotanagi elsewhere includes a cover glass within a "protruding part 4":

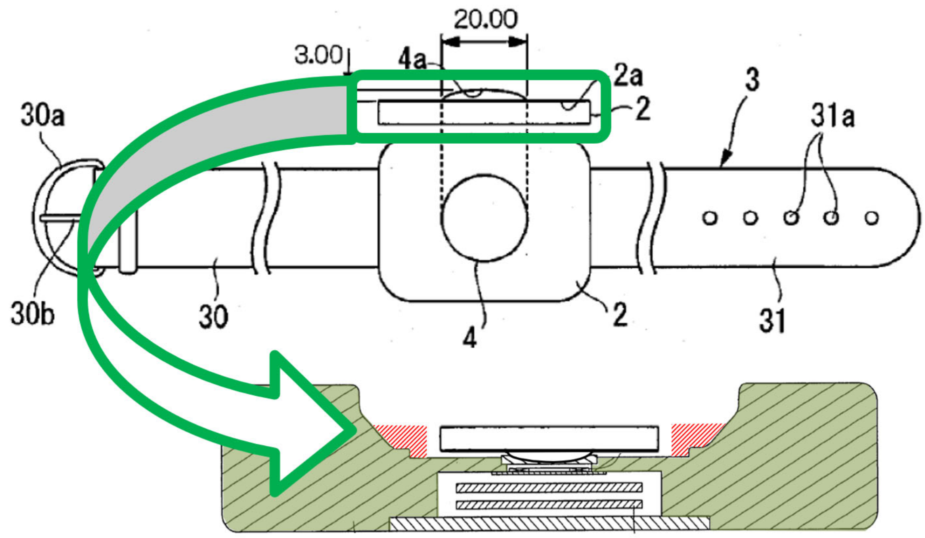




See EX1005 at 26, 27 (Figs. 5, 7). As shown above with respect to Figure 10, Kotanagi also shows how a "cover glass" can span the entire top opening of its housing. A POSITA would have understood from these teachings that Kotanagi's lower cover glass could likewise span an entire opening, such that the "protruding part 4" of Figure 10 could be a "cover glass." EX1003 ¶285.

As explained in section IV(c)(1)(c), Kotanagi and Kateraas teach the limitation of a "ceramic cover," consistent with the construction provided in § II(F)(1).

As discussed above with respect to Ground 4, Claim 12 (*see supra* §§ (IV)(D)(1) and (3), Honda teaches complementary shapes for charging, and Jabori and Park teach convex and complimentary mating surfaces for wireless charging. A POSITA would have understood from these teachings to modify Honda's charging station. EX1003 ¶286–292.



See EX1005 at 28 (Fig. 8); EX1006 at 3 (Fig. 2) (modification added).

Based on the above, Claim 8 would have been obvious in view of Kotanagi, Honda, and Jabori. Alternatively, Claim 8 would have been obvious in view of Kotanagi, Honda, and Jabori, combined with Kateraas and/or Park.

a. Motivation to Combine

As discussed above with respect to Ground 1, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda. As discussed above with respect to Ground 3, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Honda with Kateraas, and had a reasonable expectation of success in doing so. As discussed above with respect to Ground 4, a POSITA would have been motivated before the effective filing date to combine the teachings of Kotanagi and Park and Jabori. EX1003 ¶¶294–297.

V. SECONDARY CONSIDERATIONS

Secondary considerations should be considered but do not control an obviousness conclusion, particularly where, as here, a strong *prima facie* showing of obviousness exists. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). Petitioner is unaware of evidence of secondary considerations, and any such evidence could not outweigh the strong *prima facie* case of obviousness. Petitioner reserves the right to respond to any evidence of secondary considerations.

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

With respect to 35 U.S.C. § 314(a), Fintiv factors 2, 3, 4, and 6 strongly favor institution of this IPR, and factors 1 and 5 are neutral. With respect to factor 2, the final written decision in this IPR is expected long before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation approximately four months ago, on October 20, 2022, and the most recent published statistics indicate that the median time to trial for a civil action in the District of Delaware is almost three years. EX1048.

For factor 3, the parties and the court have made little investment in the Delaware Litigation. No discovery or infringement or invalidity contentions have been exchanged and claim construction briefing has not started.

For factor 4, Petitioner stipulates that, if the Board institutes this IPR, Petitioner will not pursue, in the Delaware Litigation, the specific invalidity grounds for the challenged claims raised in this Petition or that reasonably could have been raised in this Petition. This stipulation "mitigates any concerns of duplicative efforts between the district court and the Board," and, thus, factor 4 "weighs strongly in favor of not exercising discretion to deny institution." *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A).

For factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. For factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of this IPR. For factor 5, Petitioner Masimo is a defendant in the Delaware Litigation. In view of all circumstances, the judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

With respect to Section 325(d), this Petition presents the first *inter partes* challenge to the '783 patent and none of the references the Petition relies on were considered during examination. Further, the references presented herein are materially better than the references considered during examination because, as shown above, they disclose every limitation of the independent claims, including wireless charging, a ceramic cover, convex shapes, and other features. By contrast,

the Examiner found that the references considered during examination did not disclose all limitations of the independent claims. Therefore, this Petition presents new prior art and new patentability arguments that have never previously been before the Office.

VII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1–20 of the ’783 patent.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: February 27, 2023

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CERTIFICATE OF TYPE-VOLUME LIMITATIONS UNDER 37 C.F.R. § 42.24

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,627,783**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 13,791 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a).

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: February 27, 2023

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Customer No. 64,735
Attorneys for Petitioner
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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,627,783** and **EXHIBITS 1001-1012, 1014-1017, 1020, 1022, 1025-1031, 1033-1039 and 1041-1049** are being served on February 27, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 10,627,783 as addressed below:

Brownstein Hyatt Farber Schreck, LLP
410 Seventeenth Street, Suite 2200
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Dated: February 27, 2023

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EXHIBIT 16

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION
Petitioner,

v.

APPLE INC.
Patent Owner.

Case No. IPR2023-00664
U.S. Patent No. 11,106,352

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,106,352

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TABLE OF AUTHORITIES

Page No(s).

OTHER AUTHORITIES

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,106,352 ("the '352 patent")
1002	File History of the '352 patent
1003	Declaration of Craig Rosenberg, Ph.D.
1004	*Curriculum Vitae* of Craig Rosenberg, Ph.D.
1005	U.S. Patent Appl. Publication No. US 2012/0129495 A1 ("Chae")
1006	U.S. Patent Appl. Publication No. US 2013/0305351 A1 ("Narendra")
1007	*Android 4.2 lock screen widgets* (MP4 copy of November 12, 2012 YouTube video) ("Android")
1008	U.S. Patent Appl. Publication No. US 2014/0189577 A1 ("Shuttleworth")
1009	U.S. Patent Appl. Publication No. US 2013/0227418 A1 ("de Sa")
1010	U.S. Patent Appl. Publication No. US 2015/0095819 A1 ("Hong")
1011	U.S. Patent Appl. Publication No. US 2015/0346976 A1 ("Karunamuni")
1012	Excerpts from *The Design of Everyday Things*, Norman, Donald A., Doubleday, 1988 ("Norman")
1013	"Do Interface Standards Stifle Design Creativity," archive copy of "http://www.useit.com/altertbox/990822.html" from August 22, 1999, Nielsen, Jakob ("Nielsen 1")
1014	"Enhancing the Explanatory Power of Usability Heuristics," *Human Factors in Computing Systems*, 1994, Nielsen, Jakob, ("Nielsen 2")

Exhibit No.	Description
1015	"Could I have the Menu Please? An Eye Tracking Stucy of Design Conventions," *People and Computers XVII – Designing for Society*, 2004, pp. 401-414, McCarthy, John D. *et al*, ("McCarthy")
1016	"The effects of link format and screen location on visual search of web pages," *Ergonomics*, Vol. 47, No. 8, June 22, 2004, pp. 907-921, Ling, Jonathan and van Schaik, Paul ("Ling")
1017	"The effect of violating visual conventions of a website on user performance and disorientation. How bad can it be?," *SIGDOC'08*, September 22-24, 2008, Santa-Maria, Luis and Dyson, Mary C. ("Santa-Maria")
1018	U.S. Patent No. 10,466,889
1019	U.S. Patent No. 8,311,514 ("Bandyopadhyay")
1020	Reserved
1021	Declaration of Sylvia D. Hall-Ellis, Ph.D.
1022	*Curriculum Vitae* of Sylvia D. Hall-Ellis, Ph.D.
1023-1030	Reserved
1031	Declaration of Kate Talbot
1032	Résumé of Kate Talbot
1033	U.S. District Court – Judicial Caseload Profile – Delaware
1034-1040	Reserved
1041	Declaration of Nathaniel E. Frank-White

GROUND LISTING

Ground No.	Ground Description
1	Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae alone or in view of Chae and Narendra.
2	Claims 3-5, 11-13, and 19-22 would have been obvious in view of Chae, Narendra, and Shuttleworth.
3	Claims 7, 8, 15, 16, 23, and 24 would have been obvious in view of Chae, Narendra, and Karunamuni.
4	Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae and Narendra and in further view of Hong and/or Android.
5	Claims 3-5, 11-13, and 19-22 would have been obvious in view of Chae, Narendra, and Shuttleworth and in further view of Hong and/or Android.
6	Claims 7, 8, 15, 16, 23, and 24 would have been obvious in view of Chae, Narendra, and Karunamuni and in further view of Hong and/or Android.

CLAIM LISTING

Limitation	Claim Language
1a	A method, comprising:
1b	at computer system that is in communication with a display generation component and one or more input devices:
1c	while the computer system is in a power saving state, detecting an input that meets display-waking criteria;
1d	in response to detecting the input that meets the display-waking criteria, displaying, via the display generation component, a wake screen user interface;
1e	while displaying the wake screen user interface, detecting a first input that is directed to a portion of the wake screen user interface and includes first movement; and
1f	in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets first criteria, wherein the first criteria require the first movement to be in a first direction in order for the first criteria to be met: displaying of a home screen user interface that is different from the wake screen user interface, wherein the home screen user interface includes a plurality of application icons corresponding to different applications, and wherein a respective application icon of the plurality of application icons, when selected, causes display of an application corresponding to the respective application icon; and

Limitation	Claim Language
1g	in accordance with a determination that the first input meets second criteria different from the first criteria, wherein the second criteria require the first movement to be in a second direction that is different from the first direction in order for the second criteria to be met: displaying a widget screen user interface that is different from the wake screen user interface and the home screen user interface, wherein the widget screen user interface includes a plurality of user interface objects corresponding to different applications, wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the respective user interface object.
2	The method of claim 1, wherein the wake screen user interface is a user interface that has a first state that corresponds to an authenticated state of the computer system and a second state that corresponds to an unauthenticated state of the computer system.
3	The method of claim 1, including: while displaying the widget screen user interface, detecting a second input that is directed to a portion of the widget screen user interface and includes second movement; and in response to detecting the second input that is directed to the portion of the widget screen user interface: in accordance with a determination that the second input meets third criteria, wherein the third criteria require the second movement to be in the first direction in order for the second criteria to be met, displaying the home screen user interface.

Limitation	Claim Language
4	The method of claim 3, including: while the home screen user interface is displayed in response to detection of the second input, detecting a third input that is directed to a portion of the home screen user interface and includes third movement; and in response to detecting the third input that is directed to the portion of the home screen user interface: in accordance with a determination that the third input meets fourth criteria, wherein the fourth criteria require the third movement to be in a third direction that is different from the first direction and the second direction in order for the fourth criteria to be met, redisplaying the widget screen user interface.
5	The method of claim 3, including: while the home screen user interface is displayed in response to detection of the second input, detecting a fourth input that is directed to a portion of the home screen user interface and includes fourth movement; and in response to detecting the fourth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fourth input meets fifth criteria, wherein the fifth criteria require the fourth movement to be in a third direction that is different from the first direction and the second direction in order for the fifth criteria to be met, redisplaying the wake screen user interface.

Limitation	Claim Language
6	The method of claim 1, including: while the home screen user interface is displayed in response to detection of the first input, detecting a fifth input that is directed to a portion of the home screen user interface and includes fifth movement; and in response to detecting the fifth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fifth input meets sixth criteria, wherein the sixth criteria require the fifth movement to be in a fourth direction that is different from the first direction and the second direction in order for the sixth criteria to be met, redisplaying the wake screen user interface.
7	The method of claim 1, including: in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets seventh criteria, wherein the seventh criteria require the first movement to be in a fifth direction that is different from the first direction and the second direction in order for the seventh criteria to be met: displaying of a control panel user interface that is different from the wake screen user interface and the widget screen user interface, wherein the control panel user interface includes a plurality of controls for controlling one or more device functions of the computer system.

Limitation	Claim Language
8	The method of claim 7, including: while the control panel user interface is displayed in response to detection of the first input, detecting a sixth input that is directed to a portion of the control panel user interface and includes sixth movement; and in response to detecting the sixth input that is directed to the portion of the control panel user interface: in accordance with a determination that the sixth input meets eighth criteria, wherein the eighth criteria require the sixth movement to be in a sixth direction (e.g., rightward swipe) that is opposite the fifth direction in order for the eighth criteria to be met, redisplaying the wake screen user interface.
9a	A computer system, comprising:
9b1	one or more processors that are in communication with a display generation component and one or more input devices; and
9b2	memory storing instructions, the instructions, when executed by the one or more processors, cause the processors to perform operations comprising:
9c	while the computer system is in a power saving state, detecting an input that meets display-waking criteria;
9d	in response to detecting the input that meets the display-waking criteria, displaying, via the display generation component, a wake screen user interface;
9e	while displaying the wake screen user interface, detecting a first input that is directed to a portion of the wake screen user interface and includes first movement; and

Limitation	Claim Language
9f	in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets first criteria, wherein the first criteria require the first movement to be in a first direction in order for the first criteria to be met: displaying of a home screen user interface that is different from the wake screen user interface, wherein the home screen user interface includes a plurality of application icons corresponding to different applications, and wherein a respective application icon of the plurality of application icons, when selected, causes display of an application corresponding to the respective application icon; and
9g	in accordance with a determination that the first input meets second criteria different from the first criteria, wherein the second criteria require the first movement to be in a second direction that is different from the first direction in order for the second criteria to be met: displaying a widget screen user interface that is different from the wake screen user interface and the home screen user interface, wherein the widget screen user interface includes a plurality of user interface objects corresponding to different applications, wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the respective user interface object.
10	The computer system of claim 9, wherein the wake screen user interface is a user interface that has a first state that corresponds to an authenticated state of the computer system and a second state that corresponds to an unauthenticated state of the computer system.

Limitation	Claim Language
11	The computer system of claim 9, wherein the operations include: while displaying the widget screen user interface, detecting a second input that is directed to a portion of the widget screen user interface and includes second movement; and in response to detecting the second input that is directed to the portion of the widget screen user interface: in accordance with a determination that the second input meets third criteria, wherein the third criteria require the second movement to be in the first direction in order for the second criteria to be met, displaying the home screen user interface.
12	The computer system of claim 11, wherein the operations include: while the home screen user interface is displayed in response to detection of the second input, detecting a third input that is directed to a portion of the home screen user interface and includes third movement; and in response to detecting the third input that is directed to the portion of the home screen user interface: in accordance with a determination that the third input meets fourth criteria, wherein the fourth criteria require the third movement to be in a third direction that is different from the first direction and the second direction in order for the fourth criteria to be met, redisplaying the widget screen user interface.

Limitation	Claim Language
13	The computer system of claim 11, wherein the operations include: while the home screen user interface is displayed in response to detection of the second input, detecting a fourth input that is directed to a portion of the home screen user interface and includes fourth movement; and in response to detecting the fourth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fourth input meets fifth criteria, wherein the fifth criteria require the fourth movement to be in a third direction that is different from the first direction and the second direction in order for the fifth criteria to be met, redisplaying the wake screen user interface.
14	The computer system of claim 9, wherein the operations include: while the home screen user interface is displayed in response to detection of the first input, detecting a fifth input that is directed to a portion of the home screen user interface and includes fifth movement; and in response to detecting the fifth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fifth input meets sixth criteria, wherein the sixth criteria require the fifth movement to be in a fourth direction that is different from the first direction and the second direction in order for the sixth criteria to be met, redisplaying the wake screen user interface.

Limitation	Claim Language
15	The computer system of claim 9, wherein the operations include: in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets seventh criteria, wherein the seventh criteria require the first movement to be in a fifth direction that is different from the first direction and the second direction in order for the seventh criteria to be met: displaying of a control panel user interface that is different from the wake screen user interface and the widget screen user interface, wherein the control panel user interface includes a plurality of controls for controlling one or more device functions of the computer system.
16	The computer system of claim 15, wherein the operations include while the control panel user interface is displayed in response to detection of the first input, detecting a sixth input that is directed to a portion of the control panel user interface and includes sixth movement; and in response to detecting the sixth input that is directed to the portion of the control panel user interface: in accordance with a determination that the sixth input meets eighth criteria, wherein the eighth criteria require the sixth movement to be in a sixth direction (e.g., rightward swipe) that is opposite the fifth direction in order for the eighth criteria to be met, redisplaying the wake screen user interface.
17a	A computer-readable storage medium comprising

Limitation	Claim Language
17b	instructions, the instructions when executed by one or more processors of a computer system that is in communication with a display generation component and one or more input devices, cause the processors to perform operations comprising:
17c	while the computer system is in a power saving state, detecting an input that meets display-waking criteria;
17d	in response to detecting the input that meets the display-waking criteria, displaying, via the display generation component, a wake screen user interface;
17e	while displaying the wake screen user interface, detecting a first input that is directed to a portion of the wake screen user interface and includes first movement; and
17f	in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets first criteria, wherein the first criteria require the first movement to be in a first direction in order for the first criteria to be met: displaying of a home screen user interface that is different from the wake screen user interface, wherein the home screen user interface includes a plurality of application icons corresponding to different applications, and wherein a respective application icon of the plurality of application icons, when selected, causes display of an application corresponding to the respective application icon; and

Limitation	Claim Language
17g	in accordance with a determination that the first input meets second criteria different from the first criteria, wherein the second criteria require the first movement to be in a second direction that is different from the first direction in order for the second criteria to be met: displaying a widget screen user interface that is different from the wake screen user interface and the home screen user interface, wherein the widget screen user interface includes a plurality of user interface objects corresponding to different applications, wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the respective user interface object.
18	The computer-readable storage medium of claim 17, wherein the wake screen user interface is a user interface that has a first state that corresponds to an authenticated state of the computer system and a second state that corresponds to an unauthenticated state of the computer system.
19	The computer-readable storage medium of claim 17, wherein the operations include: while displaying the widget screen user interface, detecting a second input that is directed to a portion of the widget screen user interface and includes second movement; and in response to detecting the second input that is directed to the portion of the widget screen user interface: in accordance with a determination that the second input meets third criteria, wherein the third criteria require the second movement to be in the first direction in order for the second criteria to be met, displaying the home screen user interface.

Limitation	Claim Language
20	The computer-readable storage medium of claim 19, wherein the operations include: while the home screen user interface is displayed in response to detection of the second input, detecting a third input that is directed to a portion of the home screen user interface and includes third movement; and in response to detecting the third input that is directed to the portion of the home screen user interface: in accordance with a determination that the third input meets fourth criteria, wherein the fourth criteria require the third movement to be in a third direction that is different from the first direction and the second direction in order for the fourth criteria to be met, redisplaying the widget screen user interface.
21	The computer-readable storage medium of claim 19, wherein the operations include: while the home screen user interface is displayed in response to detection of the second input, detecting a fourth input that is directed to a portion of the home screen user interface and includes fourth movement; and in response to detecting the fourth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fourth input meets fifth criteria, wherein the fifth criteria require the fourth movement to be in a third direction that is different from the first direction and the second direction in order for the fifth criteria to be met, redisplaying the wake screen user interface.

Limitation	Claim Language
22	The computer-readable storage medium of claim 17, wherein the operations include: while the home screen user interface is displayed in response to detection of the first input, detecting a fifth input that is directed to a portion of the home screen user interface and includes fifth movement; and in response to detecting the fifth input that is directed to the portion of the home screen user interface: in accordance with a determination that the fifth input meets sixth criteria, wherein the sixth criteria require the fifth movement to be in a fourth direction that is different from the first direction and the second direction in order for the sixth criteria to be met, redisplaying the wake screen user interface.
23	The computer-readable storage medium of claim 17, wherein the operations include: in response to detecting the first input that is directed to the portion of the wake screen user interface: in accordance with a determination that the first input meets seventh criteria, wherein the seventh criteria require the first movement to be in a fifth direction that is different from the first direction and the second direction in order for the seventh criteria to be met: displaying of a control panel user interface that is different from the wake screen user interface and the widget screen user interface, wherein the control panel user interface includes a plurality of controls for controlling one or more device functions of the computer system.

Limitation	Claim Language
24	The computer-readable storage medium of claim 23, wherein the operations include while the control panel user interface is displayed in response to detection of the first input, detecting a sixth input that is directed to a portion of the control panel user interface and includes sixth movement; and in response to detecting the sixth input that is directed to the portion of the control panel user interface: in accordance with a determination that the sixth input meets eighth criteria, wherein the eighth criteria require the sixth movement to be in a sixth direction (e.g., rightward swipe) that is opposite the fifth direction in order for the eighth criteria to be met, redisplaying the wake screen user interface.

Masimo Corporation ("Petitioner") requests *inter partes* review of claims 1-24 of U.S. Patent No. 11,106,352 ("the '352 patent").

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is the real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the '352 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN ("the Delaware Litigation").

3. Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	**Back-up Counsel**
Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson & Bear, LLP 2tmc@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Jarom D. Kesler (Reg. No. 57,056) Knobbe, Martens, Olson & Bear, LLP 2jzk@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502 Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson & Bear, LLP 2pmn@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 64,735 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to MasimoIPR-352@knobbe.com.

B. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

C. Grounds for Standing

Petitioner certifies that the ’352 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

A. Overview of the ’352 Patent

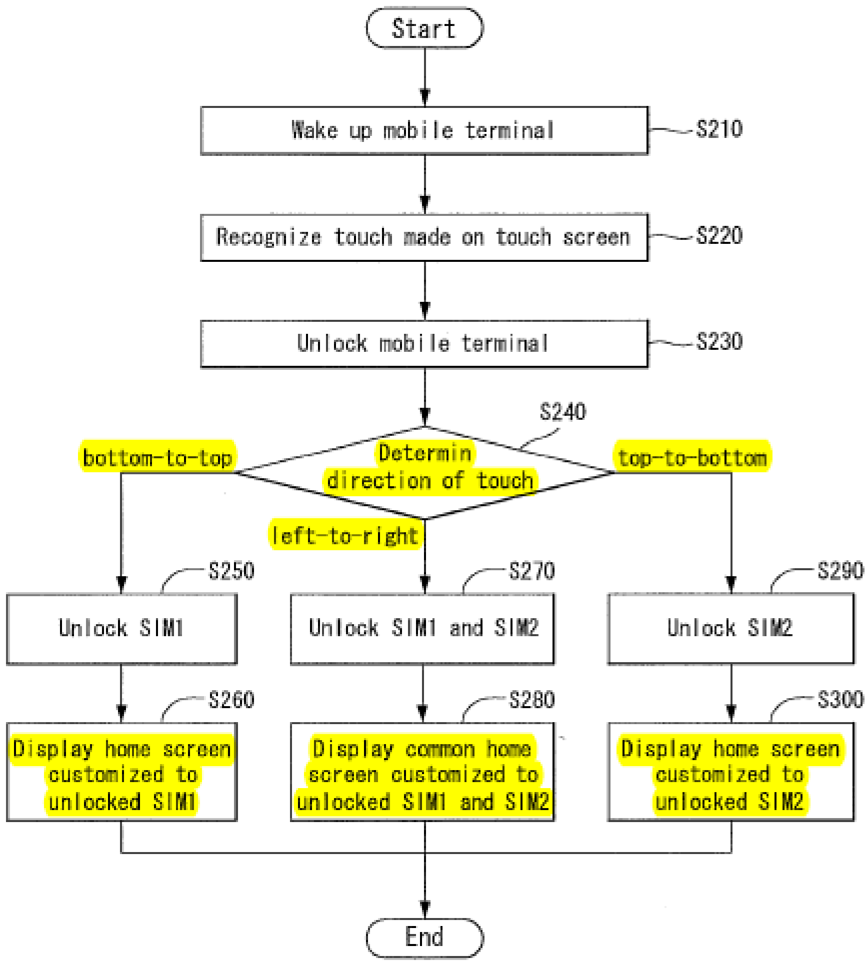
1. Technological Background

The inventor of the ’352 patent asserts he invented the familiar method of navigating between user-interface screens of a smartphone by swiping left, right, or some other direction. The prior art belies this assertion, disclosing directional swipe gestures for navigating among user-interface screens years before the ’352 patent. The references summarized below disclose every claim limitation.

a. Chae

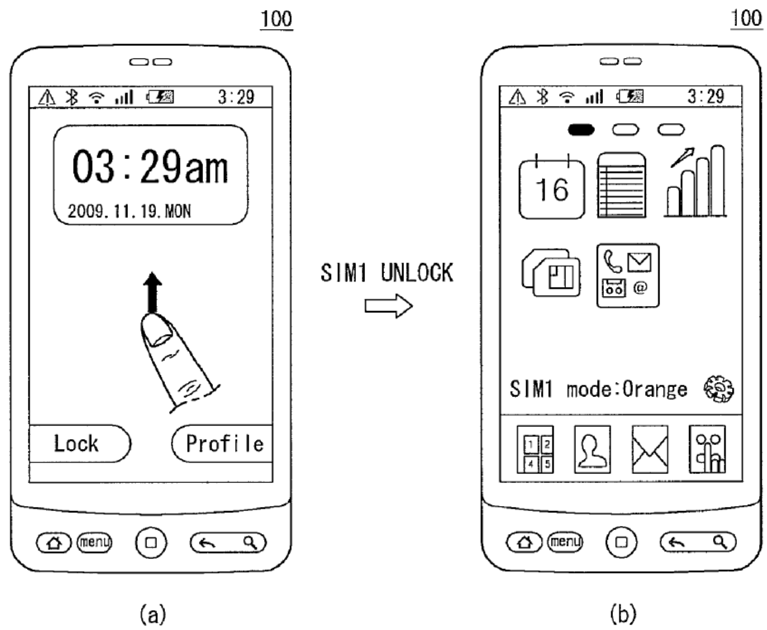
U.S. Patent Application Publication No. US 2012/0129495 A1 (Exhibit 1005 or “Chae”), filed by LG Electronics in 2011 and published in 2012, discloses a dual-SIM smartphone that uses directional swipe gestures to navigate between different user-interface screens:

FIG. 3



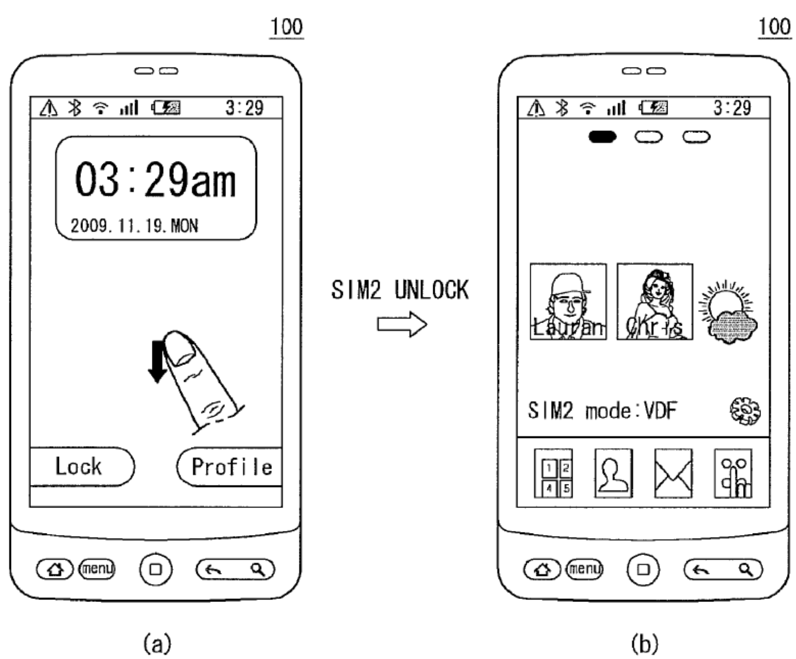
EX1005, Fig. 3. Chae further discloses that the user-interface screens include multiple application "icons and widgets." *Id.* ¶100. For example, Chae's Figure 4 illustrates a user swiping in a bottom-to-top direction to display a screen including multiple application icons:

FIG. 4



Id., Fig. 4. And Chae's Figure 6 illustrates a user swiping in a top-to-bottom direction to display a screen including multiple widgets:

FIG. 6



Id., Fig. 6; EX1003 ¶56.[1]

b. Narendra

U.S. Patent Application Publication No. US 2013/0305351 A1 (Exhibit 1006 or "Narendra"), filed in 2012 and published in 2013, discloses the use of directional swipe gestures to navigate among multiple user-interface screens of a single-SIM smartphone. Narendra shows that Chae's dual-SIM structure is not necessary to enable Chae's navigation among multiple screens using directional swipe gestures. A POSITA would have understood that Chae's technique of using directional swipe gestures to navigate among multiple screens would work just as well, and would have been just as easy to implement, in a smartphone having a single SIM as in a dual-SIM smartphone. Narendra specifically discloses a single SIM smartphone with "a touch sensitive display that accepts gestures used to navigate between the desktop screens." EX1006, Abstract. Narendra further discloses that it was well known in the art to use directional swipe gestures to navigate between smartphone screens:

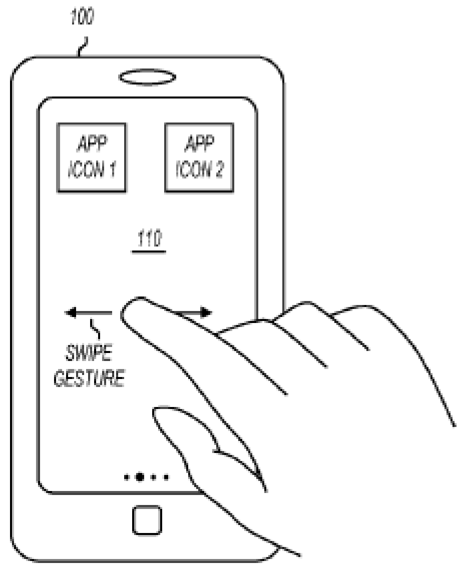
> Some prior art mobile devices include multiple desktop screens that can be navigated using gestures on the touch sensitive display. FIG. 1

[1] Exhibit 1003 is the expert declaration of Dr. Craig Rosenberg. In general, herein, a single citation to Rosenberg's declaration is provided at the end of each paragraph supported by Rosenberg's testimony.

> shows one such prior art mobile device 100 displaying one desktop screen 110 with two application icons. A user provides a left-to-right or right-to-left swipe gesture across the touch sensitive display to navigate from one desktop screen to the next.

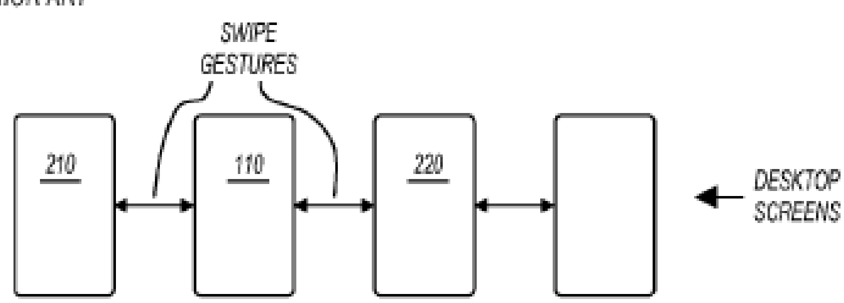
Id. ¶2. Narendra's Figure 1 illustrates a user making a directional swipe gesture to navigate from one screen to another.

FIG. 1
PRIOR ART



Id., Fig. 1. And Narendra's Figure 2 shows navigational paths between multiple screens that a user can navigate between using directional swipe gestures:

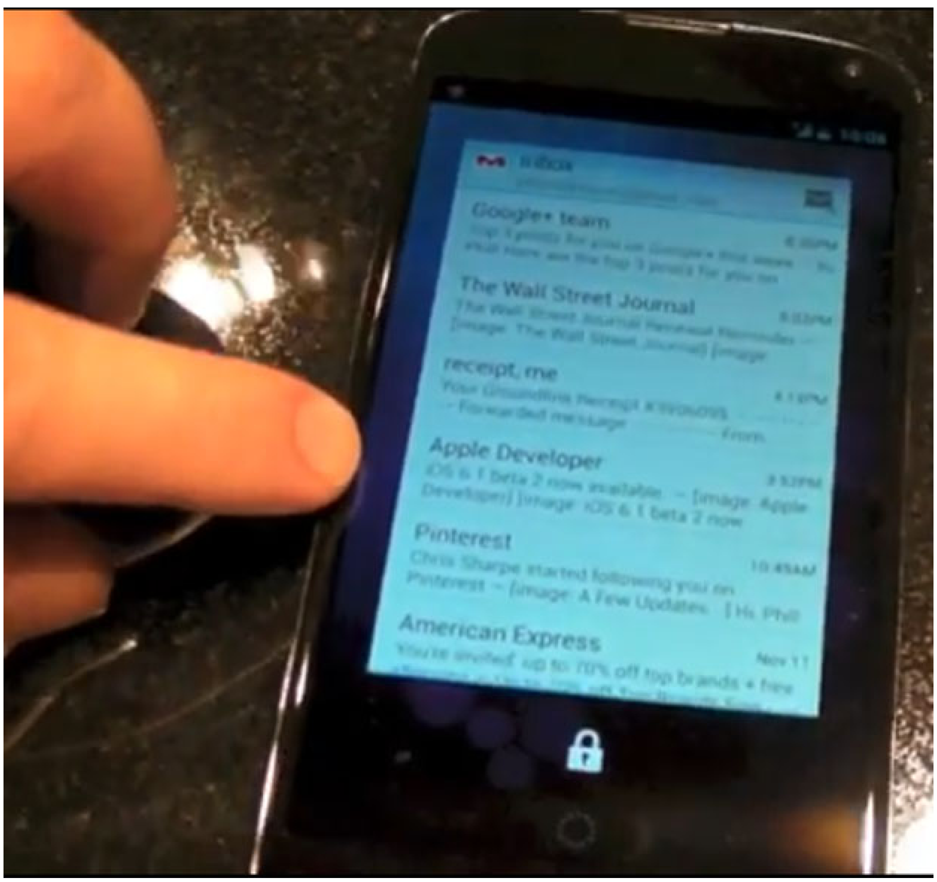
FIG. 2
PRIOR ART



EX1003 ¶57.

c. Android

The video *Android 4.2 lock screen widgets* (Exhibit 1007 or "Android") is a YouTube[2] video showing several instances of a typical smartphone entering, and waking up from, a power-saving state. The video also illustrates widgets accessible from the wake screen (also called a lock screen) by using a directional swipe gesture. For example, the still screenshot below shows an electronic mail widget.



EX1007 at 2:06. EX1003 ¶58.

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[2] Accessible at https://www.youtube.com/watch?v=ZpN8Wyu_z6Y. Exhibit 1007 is a true and correct copy of the video in MP4 format.

d. Shuttleworth

U.S. Patent Application Publication No. US 2014/0189577 A1 (Exhibit 1008 or "Shuttleworth") discloses replacing traditional physical or virtual home buttons with a dedicated directional swipe gesture for accessing the home screen from any other screen. EX1008 ¶358. EX1003 ¶59.

e. Hong

U.S. Patent Application Publication No. US 2015/0095819 A1 (Exhibit 1010 or "Hong"), filed by Samsung Electronics in 2014 and published in 2015, shows that a POSITA would have understood that a "widget" is a user interface object that displays content generated by an associated application without needing to (but being able to) open the application. Specifically, Hong's background section states:

> Recently, application widgets have been provided that enable a user to access contents provided in an application without executing the application, such as a clock, a calendar, a memo, search, a map, news, a real-time camera, and the like.

EX1010 ¶4; Hong Figure 7A depicts several such widgets on a screen:

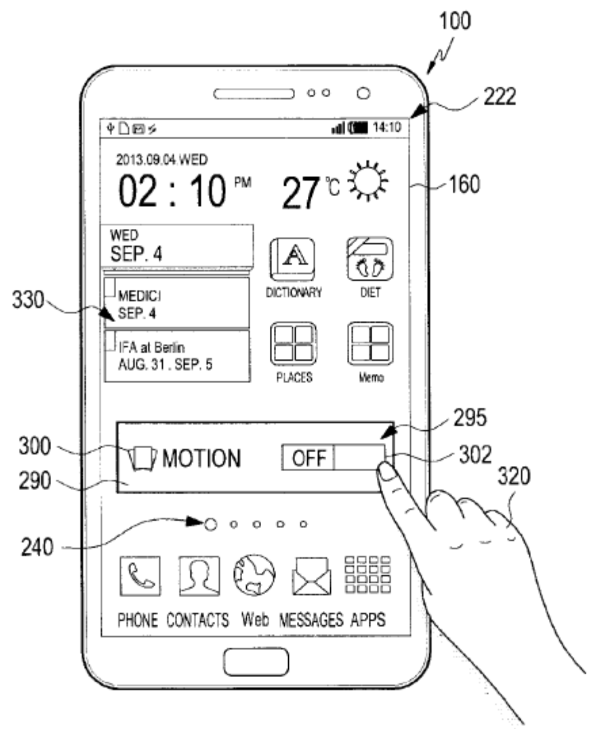


FIG.7A

EX1010, Fig. 7A. EX1003 ¶60.

f. Karunamuni

U.S. Patent Application Publication No. US 2015/0346976 A1 (Exhibit 1011 or “Karunamuni”), filed by Apple in 2015 and published in 2015, discloses a smartphone control center accessible using a directional swipe gesture:

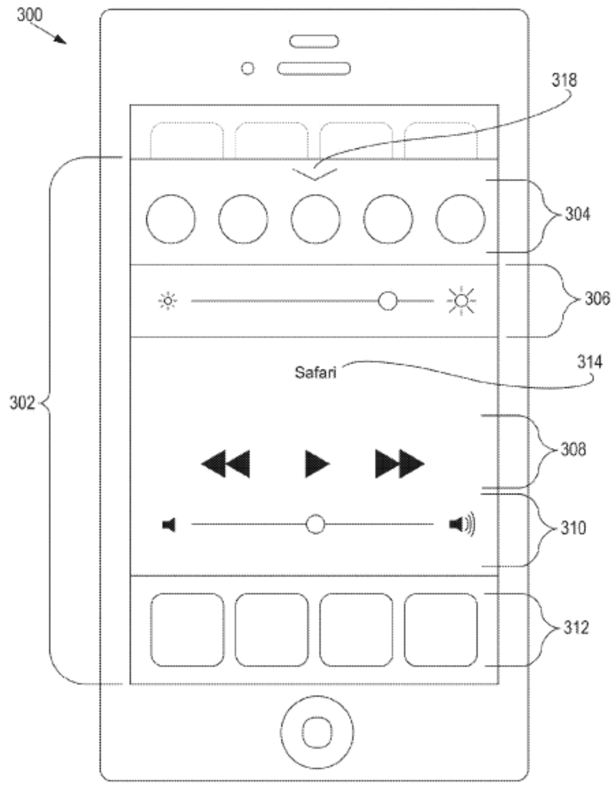


FIG. 3

EX1011, Fig. 3. Karunamuni further describes the controls:

> As shown, slider 306 is operable to change the brightness of the display of the mobile device. Slider 310 is operable to change the volume of the sound output of the mobile device.

Id. ¶17. The disclosed control center is a "control panel user interface" as claimed in some of the dependent claims of the '352 patent. EX1003 ¶61.

2. Technical Field and Level of Ordinary Skill in the Art

The '352 patent relates to a touchscreen user interface that uses gestures to navigate between different screens on a smartphone or similar electronic device. The '352 patent states its technical field "relates generally to electronic devices with

touch-sensitive surfaces, including but not limited to electronic devices with touch-sensitive surfaces that include user interfaces for ***displaying notifications***." EX1001 at 1:16-19 (emphasis added). The claims, however, are not directed specifically to user interfaces for ***displaying notifications***, but instead relate to user interfaces for ***navigating*** among different user-interface screens of touchscreen devices. *See, e.g., id.*, claims 1-24. Accordingly, based on the claims, the art of the invention is user interfaces for navigating among different user-interface screens of touchscreen devices. EX1003 ¶33.

A POSITA of the '352 patent would have had at least a bachelor's degree in a discipline related to human-computer interaction, such as Human Factors, Computer Science, Computer Engineering, or an equivalent discipline, and at least two years of experience working with touchscreen user interfaces. More education could substitute for less work experience, and vice-versa. EX1003 ¶34.

3. Apple first sought to patent efficient handling of notifications.

It is apparent from the Background and Summary sections of the '352 patent that Apple initially pursued an invention different than that claimed in the '352 patent. Specifically, the patent asserts that "user interfaces for accessing notifications, and methods of navigating to and from such interfaces, are cumbersome and inefficient" and may be "confusing" and "take longer than necessary, thereby wasting energy." EX1001 at 1:44-51. Thus, the '352 patent

further asserts "there is a need for electronic devices with faster, more efficient methods and interfaces for accessing notifications" that have "a more efficient human-machine interface." *Id.* at 1:55-63. The '352 patent's parent expressly claimed user-interface elements related to notifications. EX1018 (independent claims 1, 16, and 17).

4. Apple later pursued the '352 patent claims, more broadly relating to navigating between user-interface screens using swipe gestures.

The claims of the '352 patent do not mention notifications but relate more generally to navigation between user-interface screens. Specifically, the claims cover navigating between a wake screen, a home screen, a widget screen, and a control panel screen using familiar swipe gestures commonly used in touch-screen user interfaces. The claims do not recite any new functionality for wake screens, home screens, widget screens, and control panel screens. Thus, the alleged patentability of the claims of the '352 patent rests on claiming a particular navigation path from one user-interface screen to another in response to a swipe gesture in a particular direction. For example, claim 1 recites navigating from a wake screen to a home screen when the user swipes in one direction and navigating from the wake screen to a widget screen when the user swipes in a different direction. The other claims add similarly trivial swipe-navigation limitations. EX1003 ¶35.

B. Prosecution History

Apple filed the challenged claims in a preliminary amendment "prior to examination on the merits." EX1002 at 41-54. Just ten days later, the Examiner found the prior art does not disclose the claimed combination of limitations and allowed all claims. *Id.* at 8-15. But Apple did not submit, and the Examiner did not consider, any of the prior art presented in this Petition. *See generally id*.

C. Priority

The '352 patent claims priority to May 16, 2017. All references presented herein are prior art even assuming the claims are entitled to that date. Thus, Masimo does not contest that priority date here but reserves the right to contest it in a different proceeding.

D. Claim Construction

1. "wake screen user interface," "home screen user interface," "widget screen user interface," and "control panel user interface"

The claims relate to navigation among various user-interface screens, including a "wake screen user interface," a "home screen user interface," a "widget screen user interface," and a "control panel user interface." The labels "wake," "home," "widget," and "control panel" are shorthand terms to identify and distinguish the different user-interface screens. As explained in subsections (a) through (d) below, additional claim language associated with these shorthand terms defines the full scope of the user-interface limitations. For example, claims 1, 9, and

17 define the "home screen user interface" by reciting that it is "different from the wake screen user interface" and "includes a plurality of application icons corresponding to different applications." The specification supports construing the user-interface limitations in accordance with their associated claim language. EX1003 ¶¶37-38.

a. "wake screen user interface"

Claims 1, 9, and 17 recite a "wake screen user interface." In view of the associated claim language, the "wake screen user interface" is a user interface displayed when the device wakes up. Specifically, each of claims 1, 9, and 17 recites "detecting an input that meets display-waking criteria" and "in response to detecting the input that meets the display-waking criteria, displaying … a wake screen user interface." The claims do not recite any specific content that needs to be displayed on the wake screen user interface. EX1003 ¶39.

Consistent with the claim language, the specification describes "waking the device from the screen-off state to the screen-on state" and then "displaying a wake screen user interface." EX1001 at 2:31-34, 3:63-66. The specification further indicates that, "[i]n some embodiments, wake screen user interface 504 is a user interface that is displayed when the device transitions from a screen-off state to a screen-on state." *Id.* at 38:18-20; *see also id.* at 48:24-29. The specification further states that "a wake screen user interface 504 is displayed on waking the device." *Id.*

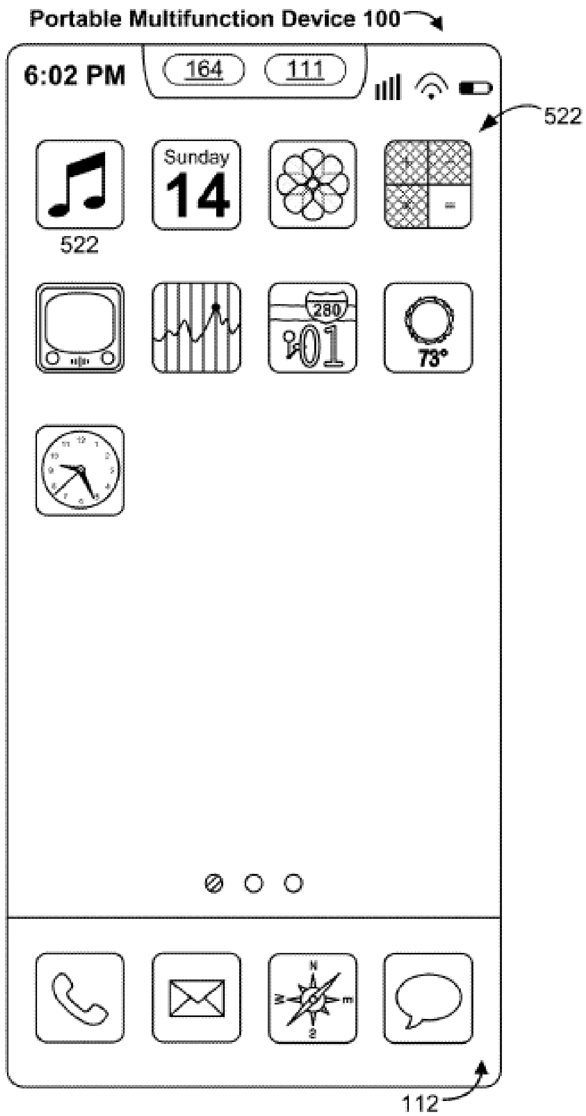
at 50:32-33. The specification describes various types of content that can be displayed on embodiments of the wake screen. But nothing in the claims or specification suggests that such content is mandatory. EX1003 ¶¶40-41.

Accordingly, "wake screen user interface" means a user interface displayed when the device wakes up. This does not imply that the wake screen is displayed ***only*** when the device wakes up. Indeed, claim 5 allows the user to navigate directly from the home screen to the wake screen. EX1003 ¶¶42-43.

b. "home screen user interface"

Claims 1, 9, and 17 recite a "home screen user interface." The associated claim language defines the "home screen user interface" to be a screen "different from the wake screen user interface" and that "includes a plurality of application icons corresponding to different applications." EX1003 ¶44.

The specification repeatedly refers to various figures that depict "home screen user interface 522," shown below, for example, in Figure 5H:



EX1001, Fig. 5H; *see e.g., id.* at 39:20-22 (Fig. 5H), 39:27-32 (Fig. 5K), 40:61-64 (Figs. 5AG-5AH), 44:16-21 (Figs. 5CC-5CQ), 46:44-50 (Figs. 5DJ-5DS), 52:8-24 (Fig. 5FU). The figures depicting "home screen user interface 522" consistently show a screen having multiple application icons corresponding to different applications." Moreover, the specification describes the "home screen user interface 522" as "a user interface for a menu of application as described with regard to FIG.

4A).” *Id.* at 39:20-22. The specification states, “FIG. 4A illustrates an example user interface for a menu of applications on portable multifunction device 100 in accordance with some embodiments.” *Id.* at 30:24-26. Figure 4A is shown below.

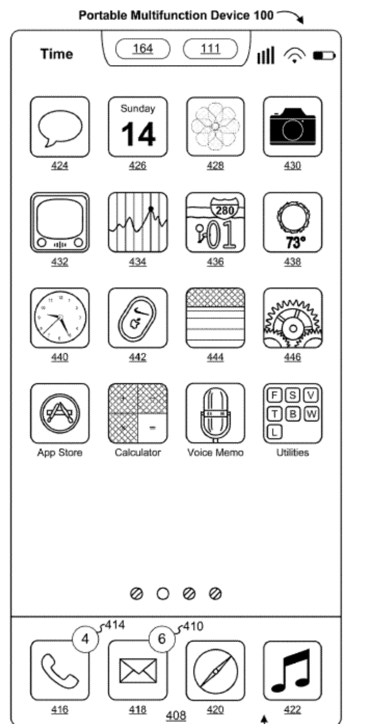


Figure 4A

Id., Fig. 4A. As shown in Figure 4A, an “interface for a menu of applications” is simply multiple application icons on a user-interface screen. EX1003 ¶45.

Accordingly, the “home screen user interface” of claims 1, 9, and 17 is a screen “different from the wake screen user interface” and that “includes a plurality of application icons corresponding to different applications.” A POSITA would have understood that the claim language indicating the home screen “includes a plurality of application icons” does not restrict the home screen to ***only*** including

application icons. A POSITA would have understood that a "home screen user interface" may also include widgets, controls, or other objects. EX1003 ¶46.

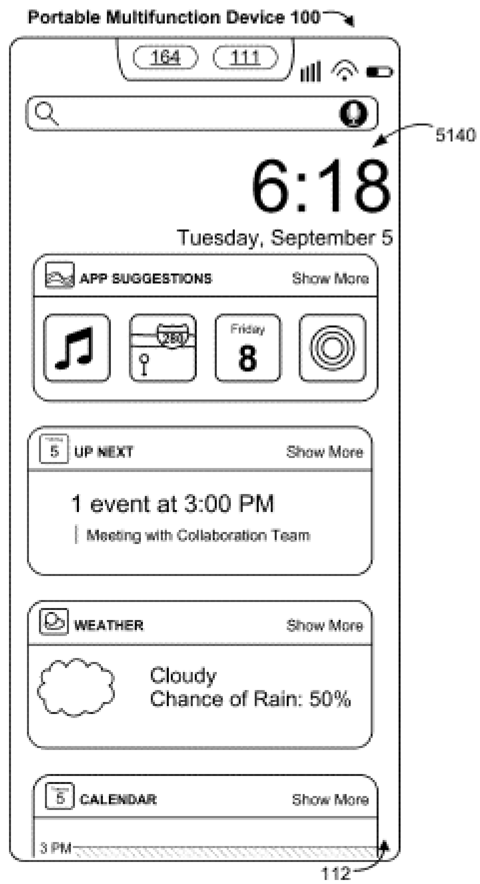
c. "widget screen user interface"

Claims 1, 9, and 17 recite a "widget screen user interface." The associated claim language defines the "widget screen user interface" to be a screen "different from the wake screen user interface and the home screen user interface" and that "includes a plurality of user interface objects corresponding to different applications, ***wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the respective user interface object***." EX1001, claims 1, 9, 17 (emphasis added). A POSITA would have understood the emphasized language distinguishes the "user interface objects" included on the "widget screen user interface" from the "application icons" included on the "home screen user interface." EX1003 ¶47.

The specification is consistent with this construction. The claim language emphasized above does not appear in the specification filed with the parent application. Apple added the emphasized language to the Abstract on June 29, 2020. EX1002 at 200. Thus, the Abstract disclosure does not entitle the claims to the parent application's May 16, 2017 filing date. Rather, the claims may be entitled to

the parent's filing date only if the May 16, 2017 specification supports the claim language. Two ways in which the specification may support the claim language are (1) the term "widget" used in the parent specification was understood by a POSITA to mean a user interface object containing application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the user interface object and/or (2) the drawings or description of the widget user interface would indicate that meaning of the term "widget" to a POSITA. For purposes of this Petition, Masimo assumes the claims are supported by the May 16, 2017 specification for one or both of these reasons. But Masimo reserves the right to challenge the claims for lack of written description in another forum.

Outside of the Abstract, the specification does not use the phrase "widget screen user interface" but references a "widget user interface 5140." *See, e.g.,* EX1001 at 48:64, 49:2-3, 52:8-35. Several figures depict the widget user interface 5140, including Figure 5CK:



EX1001, Fig. 5CK. As shown, the widget user interface 5140 appears to display a calendar reminder showing a reminder for a meeting at 3:00 pm and weather information indicating a 50% chance of rain. Assuming that the drawings and specification provide written description for the claim language, they support construing "widget screen user interface" to mean a screen "different from the wake screen user interface and the home screen user interface" and that "includes a plurality of user interface objects corresponding to different applications, wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user

interface object, and when selected, causes display of an application corresponding to the respective user interface object." A POSITA would have understood that the claim language indicating the widget screen "includes a plurality of user interface objects" does not restrict the home screen to ***only*** including such user interface objects. A POSITA would have understood that a "widget screen user interface" may also include application icons, controls, or other objects. EX1003 ¶¶48-49.

d. "control panel user interface"

Claims 7, 8, 15, 16, 23, and 24 recite a "control panel user interface." The associated claim language defines "control panel user interface" to be a screen "different from the wake screen user interface and the widget screen user interface" and that "includes a plurality of controls for controlling one or more device functions of the computer system." EX1003 ¶50.

The specification states "the displayed first user interface is a control panel user interface, wherein the control panel user interface includes one or more device controls for controlling one or more device functions of the device." EX1001 at 4:15-18, 80:15-22. Further, several drawings depict the control panel user interface 5138, including Figure 5CE:

A POSITA would have understood the above as depicting several "controls for controlling one or more device functions," including a brightness control, a volume control, a toggle control for airplane mode, and other controls. However, nothing in the claims or specification suggests that these specific controls are mandatory. Thus, a POSITA would have understood the "control panel user interface" limitation has at least two controls but is not limited to a specific type of controls. EX1003 ¶51.

Accordingly, the "control panel user interface" limitation means a screen "different from the wake screen user interface and the widget screen user interface" and that "includes a plurality of controls for controlling one or more device functions

of the computer system." A POSITA would have understood that the claim language indicating the control panel user interface "includes a plurality of controls for controlling one or more device functions of the computer system" does not restrict the control panel to ***only*** including controls. A POSITA would have understood that a "control panel user interface" may also include application icons, widgets, or other objects. EX1003 ¶52.

2. "input that is directed to a portion of" a user interface

Numerous claims recite navigational actions invoked by "input that is directed to a portion of" the current screen. This claim language means the input is directed to part of the screen, rather than a physical button, keyboard, or other input device external to the screen. The claim language does not require the input to be directed to a ***predefined*** location on the screen, such as a location marked by a virtual home button or other indicator. EX1003 ¶53.

The specification supports this construction. The specification describes a first embodiment in which a user navigates from a wake screen to a home screen by an upward swipe "at location that corresponds to home affordance 552, as indicated by focus selector 5244." EX1001 at 53:4-10; *see also id.*, Fig. 5GC. But the claim language is not limited to this first embodiment. The specification also describes a second embodiment in which screen-to-screen navigation involves swipe gestures having no specified starting location:

> While displaying the wake screen user interface, the device detects (906) a first swipe gesture …. In accordance with a determination that the first swipe gesture is in a first direction (e.g., rightward …), the displayed first user interface is a mini-application-object user interface 5140. … In accordance with a determination that the first swipe gesture is in a second direction (e.g., leftward …), that is opposite the first direction, the displayed first user interface is a control panel user interface 5138.

EX1001 at 79:64-80:22. In this second embodiment, the swipe gestures are directed to part of the screen but are not required to start at any predefined location. Nothing in the claim language limits the claims to just the narrower first embodiment. Rather, a POSITA would interpret the claim language "input directed to a portion of" a screen broadly enough to cover ***both*** the first and second embodiments. As such, "input is directed to a portion of" the screen means user input is directed to part of the screen (but not at a ***predefined*** location) rather than a physical button, keyboard, or other input device external to the screen. EX1003 ¶54.

3. "first," "second," "third," etc.

The claims use ordinal numbers merely as labels to identify instances of "input," "criteria," "movement," and "direction." Beyond serving this identification function, the ordinal numbers do not convey any additional meaning or otherwise limit the claims. For example, the ordinal numbers do not imply any ordering or prioritization (*e.g.*, the "first input" need not happen before the "second input").

They also do not imply the existence of unclaimed instances (*e.g.*, claim 7's recitation of "seventh criteria" does not imply that claim 7 also has "third criteria," "fourth criteria," "fifth criteria," and "sixth criteria"). And while some claims expressly recite a relationship between the claimed instances (*e.g.*, claim 1 recites "second criteria ***different from*** the first criteria"), the mere usage of different ordinal numbers does not imply such a relationship. EX1003 ¶55.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Cancellation Ground

Petitioner requests that the Board cancel claims 1-24 because they would have been obvious under post-AIA 35 U.S.C. § 103 in view of the prior art identified below.

B. Prior-Art Status

The following references are prior art for the following reasons:

Exhibit No.	Short Description	Prior Art Basis
1005	Chae	102(a)(2)[3] patent application published May 24, 2012.
1006	Narendra	102(a)(2) patent application published November 14, 2013.

[3] All statutory sectional references in this table are to post-AIA 35 U.S.C. § 102.

Exhibit No.	Short Description	Prior Art Basis
1007	Android	102(a)(1) printed publication publicly accessible on YouTube by November 19, 2012. EX1041 at 1 (¶5), 4-5; EX1003 ¶58; EX1031 ¶¶13-26; *Jazz Pharms., Inc. v. Amneal Pharms., LLC*, 895 F.3d 1347, 1352, 1358–60 (Fed. Cir. 2018) (affirming finding that a video posted online was a printed publication).
1008	Shuttleworth	102(a)(2) patent application published July 3, 2014.
1009	de Sa	102(a)(2) patent application published August 29, 2013.
1010	Hong	102(a)(2) patent application published April 2, 2015.
1011	Karunamuni	102(a)(2) patent application published December 3, 2015.
1012	Norman	102(a)(1) printed publication publicly accessible by March 1, 1990. EX1021 ¶¶35-42.
1013	Nielsen 1	102(a)(1) printed publication publicly accessible by August 22, 1999. EX1041 at 1 (¶5), 7-9; EX1015 at 413 (prior-art publication referencing EX1013); EX1016 at 920 (same); EX1017 at 54 (same).
1014	Nielsen 2	102(a)(1) printed publication publicly accessible by April 24, 1995. EX1021 ¶¶43-50.
1015	McCarthy	102(a)(1) printed publication publicly accessible by February 17, 2004. EX1021 ¶¶51-57.
1016	Ling	102(a)(1) printed publication publicly accessible by June 22, 2004. EX1021 ¶¶58-64.

Exhibit No.	Short Description	Prior Art Basis
1017	Santa-Maria	102(a)(1) printed publication publicly accessible by September 22, 2008. EX1021 ¶¶65-69.
1019	Bandyopadhyay	102(a)(2) patent issued November 13, 2012.

These references constitute analogous art because they are from the same field of endeavor as the ’352 patent, *e.g.*, GUIs for electronic devices with touchscreens. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, *e.g.*, efficiently switching between different user-interface screens. As these references are analogous art, a POSITA is presumed to have been aware of them. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988).

IV. GENERAL MOTIVATION TO COMBINE AND REASONABLE EXPECTATION OF SUCCESS

A. Principles of User-Interface Design

In addition to the prior art summarized above, a POSITA would have understood basic principles of user-interface design that were well known before the ’352 patent. Rosenberg explains these principles, and his explanation is supported by prior-art documents. *See* EX1003 ¶¶62-70 (citing EX1012-EX1014).

For example, a user interface should be consistent with a good ***mental model*** (also known as a ***conceptual model***) that tracks users’ understanding of how the user

interface should work and, thus, helps users anticipate the effects and outcomes of their interactions with the user interface. When using software, people develop mental models largely based on their past experiences gained from using similar software or similar user interfaces. These mental models help inform users how they think the software should work and what is expected from the software and the users as they operate it. These mental models aid users in determining what inputs they should provide to the system to accomplish their goals. EX1003 ¶¶62-64 (citing EX1012 at 13, 14, 17).

Narendra discloses a user-interface design with a good mental model consistent with how most users understand navigating among user-interface screens. Narendra discloses a smartphone user interface in which the user can view just one screen at a time but can navigate among a large collection of screens, as shown below in Figure 9.

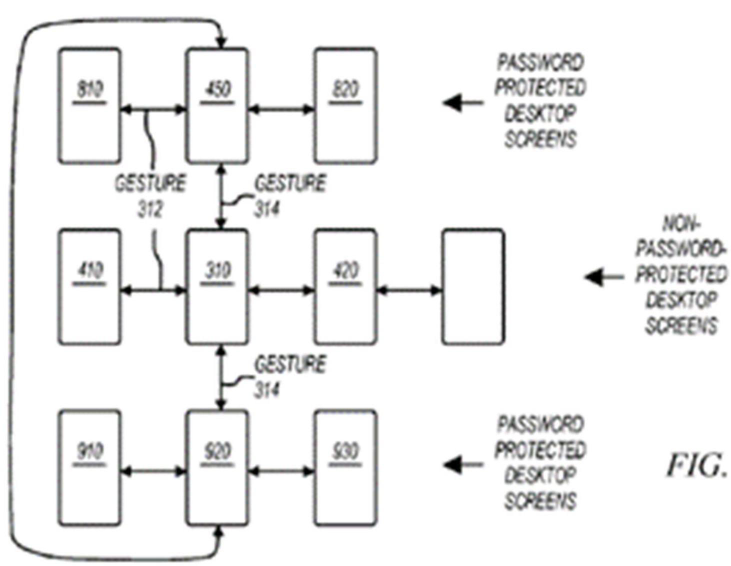


FIG. 9

EX1006, Fig. 9. Figure 9 also shows that the user can navigate among the screens by using directional swipe gestures to move horizontally from one screen to another by swiping left or right or to move vertically by swiping up or down. EX1003 ¶65.

Narendra's navigational system of using four directional swipe gestures (up, down, left, right) would make sense to users because it is consistent with a familiar mental model in which users think of the current screen as one part of a larger "map" in which additional screens are located to the left, right, up, or down. In this mental model, it makes sense to users to swipe left, right, up, or down to pan the display to the screen located to the left, right, up, or down of the current screen. Users would be familiar with this user-interface paradigm from using mobile operating systems (*e.g.*, Android and iOS) that support horizontally moving between screens as well as moving back and forth using digital map software that supports panning to view territory to the North, South, East, and West. EX1003 ¶66.

Narendra's navigational system makes particular sense for a user interface that supports a large number of screens, such as the ten screens shown in Narendra Figure 9. If Narendra were designed to have a unique directional swipe gesture for each of the ten screens of Figure 9, the user would have to memorize ten different directional swipe gestures, one for each screen. But Narendra's design allows the user to use just four directional swipe gestures (up, down, left, and right) to easily navigate between all screens. EX1003 ¶67.

Consistency is another basic principle of good user-interface design that was well known before the ’352 patent. A well-known researcher in user interface design, Dr. Jakob Nielsen, has listed “consistency” as one among ten usability heuristics, explaining: “Users should not have to wonder whether different words, situations, or actions mean the same thing.” EX1014. EX1003 ¶68 (citing EX1013-EX1014).

One way to promote consistency, as illustrated by Narendra’s navigational system, is to have four directional swipe gestures, each of which always results in navigating in a particular direction from one screen to another. Specifically, (1) swiping left always navigates to the screen to the left of the current screen, (2) swiping right always navigates to the screen to the right of the current screen, (3) swiping up always navigates to the screen above the current screen, and (4) swiping down always navigates to the screen below the current screen. EX1003 ¶69.

Another way to promote consistency, for which Shuttleworth provides an example, is to provide a unique directional swipe gesture that always navigates to the home screen from any other screen. A POSITA would have understood this approach would have been easy to implement in combination with Narendra’s approach, such that a user can always navigate to the home screen using a single unique directional swipe gesture while using Narendra’s four directional swipe gestures to navigate between a spatial arrangement of numerous non-home screens,

as described above. A POSITA would have understood that such a combination would provide the advantages of both systems, allowing the user to easily navigate among a large number of screens without memorizing a unique directional swipe gesture for every screen while also easily navigating to the home screen from anywhere using a single unique directional swipe gesture. EX1003 ¶70.

B. A POSITA would have been motivated to combine, and would reasonably have expected success in combining, any two or more of Chae, Narendra, Android, Shuttleworth, Hong, and Karunamuni.

Chae, Narendra, Android, Shuttleworth, Hong, and Karunamuni are all in the same field of touchscreen user interfaces for smartphones. Further, each of these prior-art references discloses one or more user-interface features that would enhance the ease-of-use and user-friendliness of a touchscreen user interface for a smartphone. A POSITA would have understood that the advantages of the disclosed features are compatible with and additive of each other, such that providing a combination of the disclosed features in a single smartphone user interface would further enhance ease-of-use and user-friendliness beyond providing just one of the disclosed features. A POSITA would have been motivated, by the enhancement to the ease-of-use and user-friendliness of the user interface that each feature would have provided, to combine any two or more of the disclosed features to maximize the ease-of-use and user-friendliness of the user interface. Moreover, each of these features would have been easy to implement in software without needing to

overcome any technical barrier or to make any changes to the hardware configuration of any smartphone. Thus, a POSITA would have reasonably expected success in combining the features to achieve the additive advantages of the combined features. A POSITA would have understood such a combination to be a simple combination of familiar user-interface features to perform their established functions to achieve the predictable result of additional ease-of-use and user-friendliness. EX1003 ¶71.

The general motivation to combine discussed above is applicable to all grounds of unpatentability set forth below. In addition to this general motivation to combine, a POSITA would also have been motivated to combine the prior art for specific reasons set forth in the analysis below. EX1003 ¶72.

V. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

Claims 1-24 of the ’352 patent would have been obvious.

A. Ground 1: Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae alone or in view of Chae and Narendra.

1. Claim 1

Chae discloses the preamble and every limitation of claim 1, and, thus, anticipates or renders obvious claim 1. Moreover, if Chae is interpreted as lacking any limitation of claim 1, it would have been obvious to add such limitation to Chae in view of Narendra.

a. Limitation 1a (preamble)

Limitation 1a recites a "method." Chae discloses "one example of the ***method*** for operating a mobile terminal." EX1005 ¶101 (emphasis added); EX1003 ¶73.

b. Limitation 1b

Chae discloses a method performed "at computer system that is in communication with a display generation component and one or more input devices," as required by limitation 1b. Chae discloses a "mobile terminal" that "can include … a smart phone, a laptop computer," or other devices. EX1005 ¶¶10, 43. A POSITA would have understood that a "smart phone" or a "laptop computer" is a "computer system," and, thus, the disclosed mobile terminal is a "computer system." EX1003 ¶74.

Chae also discloses its mobile terminal "comprises a ***touch screen***" and can be unlocked "***in response to a touch made on the touch screen***." EX1005 ¶10 (emphases added). Figure 4(a) illustrates such unlocking:

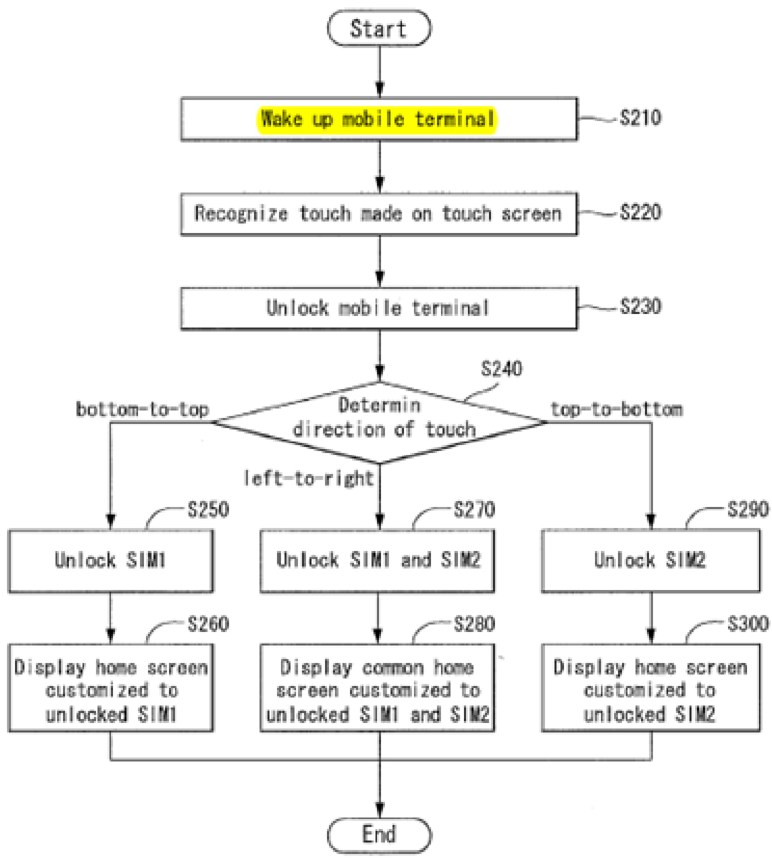
(a)

EX1005, Fig. 4(a), ¶104. Figure 4(a) illustrates that the touchscreen is a "display generation component" that, in the example, displays a digital clock. Further, a swipe in a "bottom-to-top direction … unlocks the first SIM." EX1005, Fig. 4(a), ¶104. A "touch made on the touch screen" is an input that causes such unlocking. EX1005 ¶10. Thus, the touchscreen is an "input device." EX1003 ¶75.

c. Limitation 1c

Chae discloses "while the computer system is in a power saving state, detecting an input that meets display-waking criteria," as required by limitation 1c. Figure 3 illustrates waking up the mobile terminal in step S210:

FIG. 3



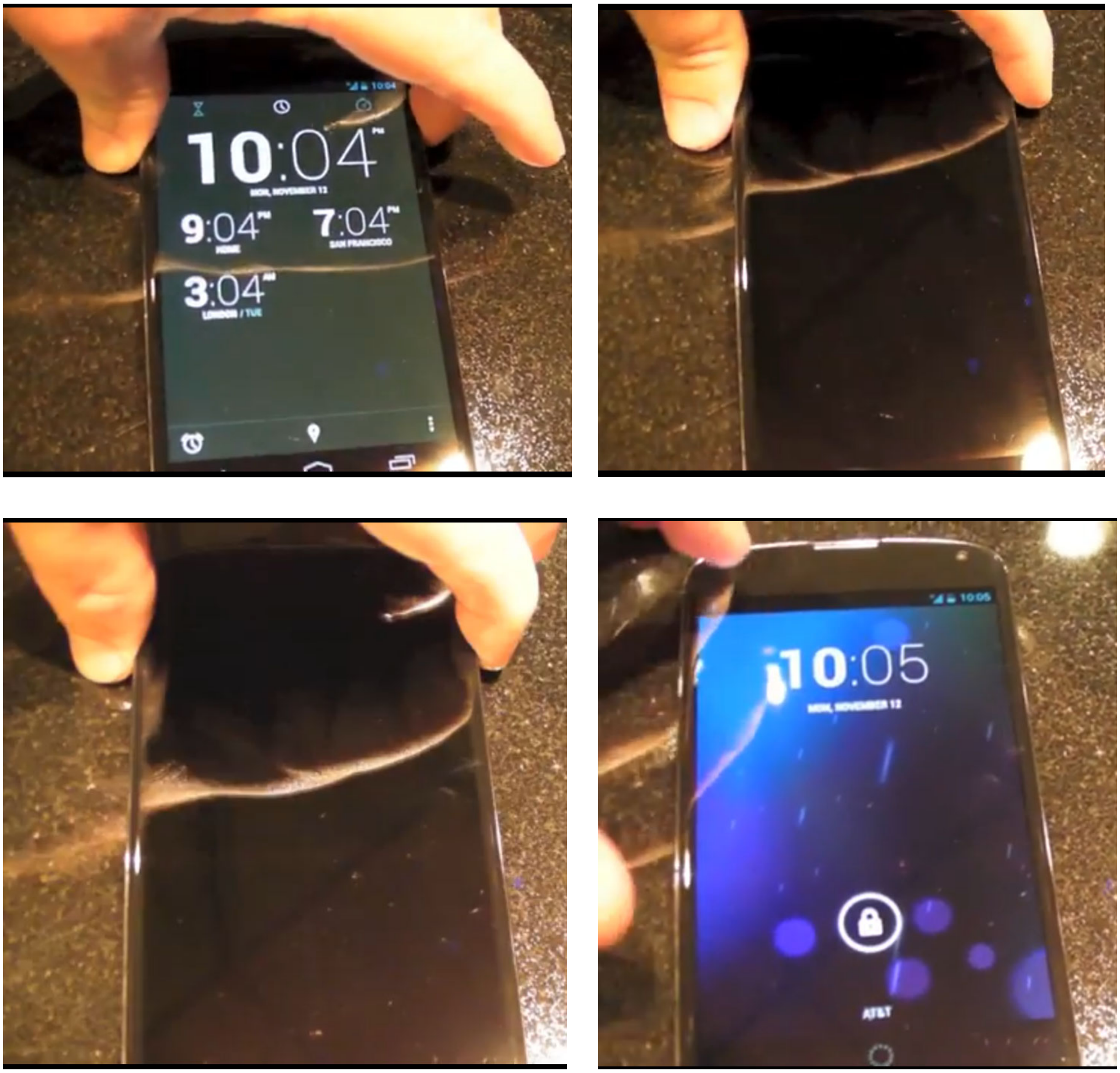
EX1005, Fig. 3 (annotated). The specification indicates that, because "steps S210 to S230 of FIG. 3 are identical to the steps S110 to S130, the detailed descriptions thereof are omitted herein." *Id.* ¶102. Accordingly, a POSITA would have understood that the specification's descriptions of steps S110 to S130 (which are

illustrated in Figure 2) also describe the identical steps S210 to S230 of Figure 3. With respect to step S110 (identical to step S210), the specification teaches:

> At step S110, the controller 180 of the mobile terminal 100 wakes up the mobile terminal 100 in response to a control signal that is generated based on a user's action such as clicking a button (not shown).

Id. ¶94. Waking up a smartphone was a well-known process years before the '352 patent. During periods of inactivity, mobile devices commonly went into a "sleep" or power-saving mode in which the display was turned off so the device would use less power. *See, e.g.,* EX1019 at 4:39-65. A POSITA would have understood that the process of waking up a mobile device includes turning on the previously sleeping display so the device can be operated. *Id.* EX1003 ¶76.

Android (Exhibit 1007) shows a typical smartphone entering, and waking up from, a power-saving state. The following still screenshots show a button push causing a smartphone to enter and wake up from a power-saving state (including its display turning on and off):



EX1007 at 0:24-0:28; *see also id.* at 0:40, 1:07, 2:30, 2:59, 3:20, 3:46.[4] EX1003 ¶77.

A POSITA would have understood Chae's disclosure that the mobile terminal "wakes up" to refer to the typical wake-up process that was well-known and

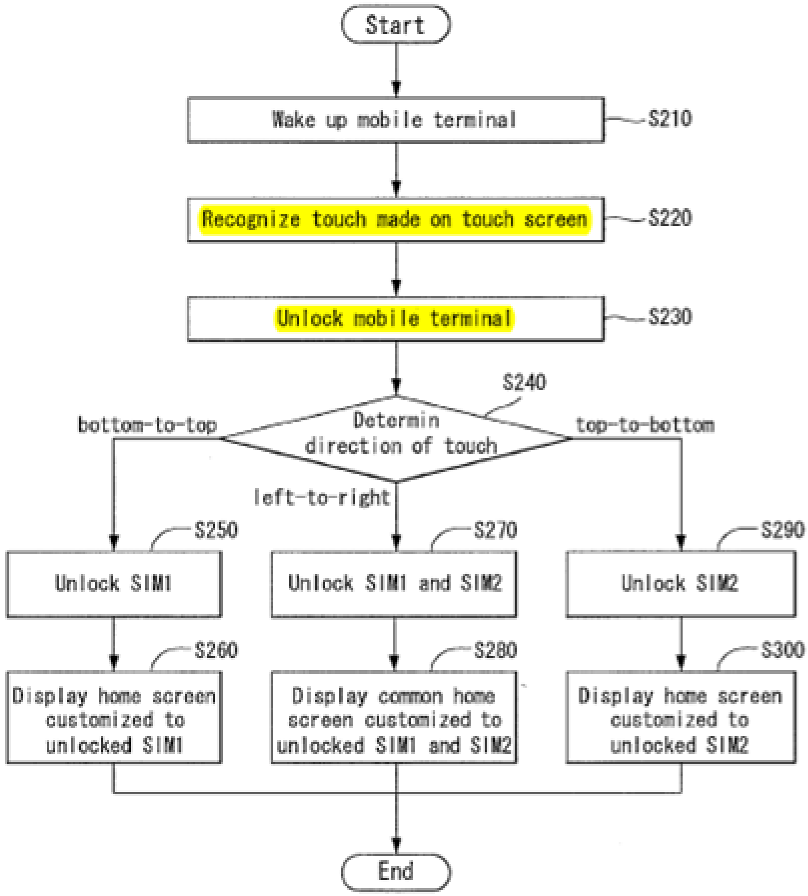
[4] Android is cited here as background to illustrate the well-known wake-up process that a POSITA would understand Chae discloses.

commonly implemented in smartphones. Specifically, a POSITA would have understood that the mobile terminal was in "a power saving state" prior to waking up. A POSITA would have understood Paragraph 94's reference to a "user's action such as clicking a button" to be an "input that meets display-waking criteria." Indeed, Chae discloses that the user's action does, in fact, cause the mobile terminal (including its display) to wake up. EX1003 ¶78.

d. Limitation 1d

Chae discloses "in response to detecting the input that meets the display-waking criteria, displaying, via the display generation component, a wake screen user interface," as required by limitation 1d. As explained above, a "wake screen user interface" is a user interface displayed when the device wakes up. *See supra* II.E.1.a. In steps S220 and S230, a user touch of the touchscreen unlocks the mobile terminal:

FIG. 3

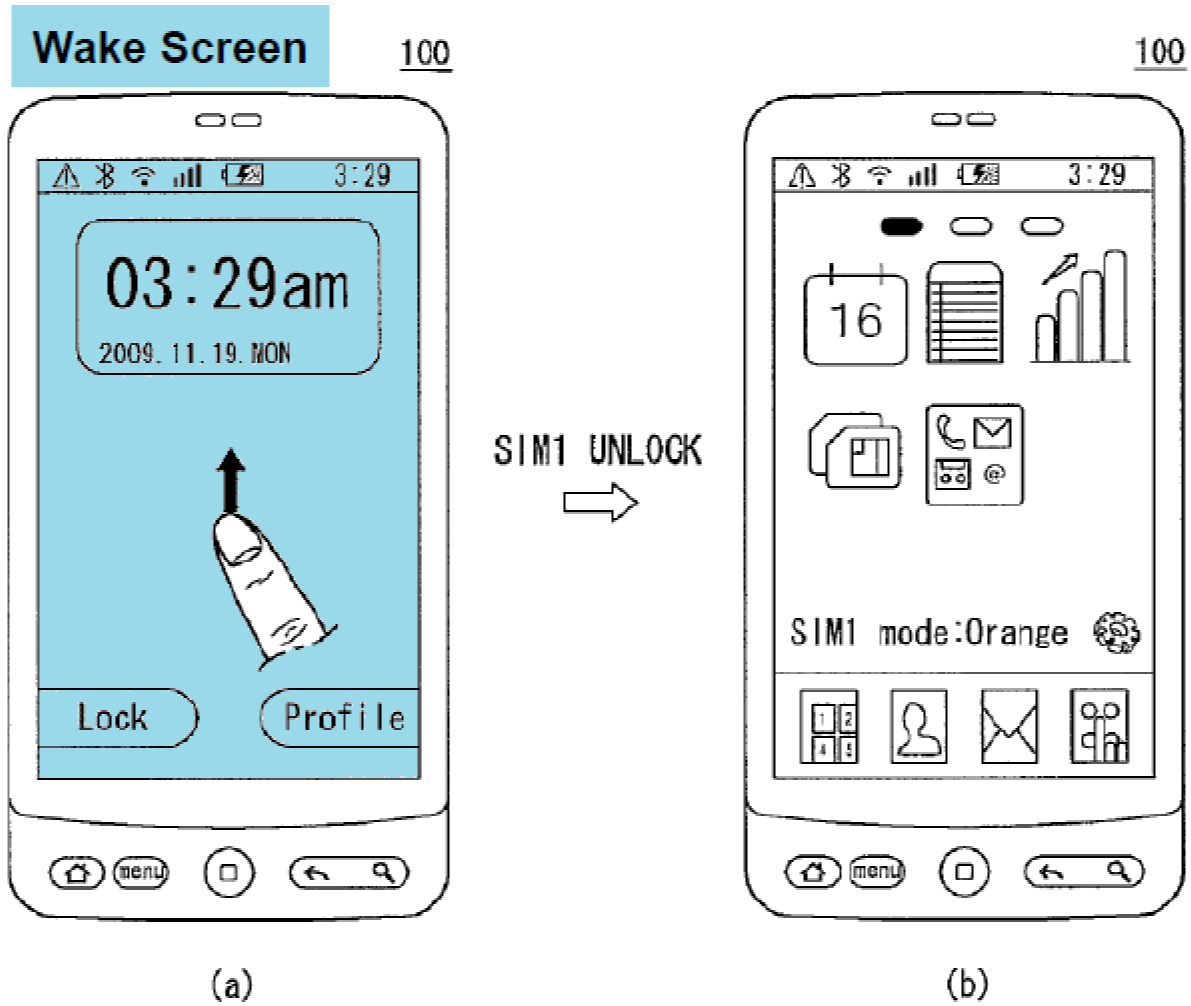


EX1005, Fig. 3. As explained in Paragraph 102, steps S220 and S230 are identical to steps S120 and S130, described in Paragraph 95:

> When the user touches the touch screen of the mobile terminal 100 at step S120 the controller 180 unlocks the mobile terminal 100 in response to the touch at step S130.

Id. ¶95. Figure 4(a) illustrates the user touching the touchscreen when it is displaying a wake screen:

FIG. 4

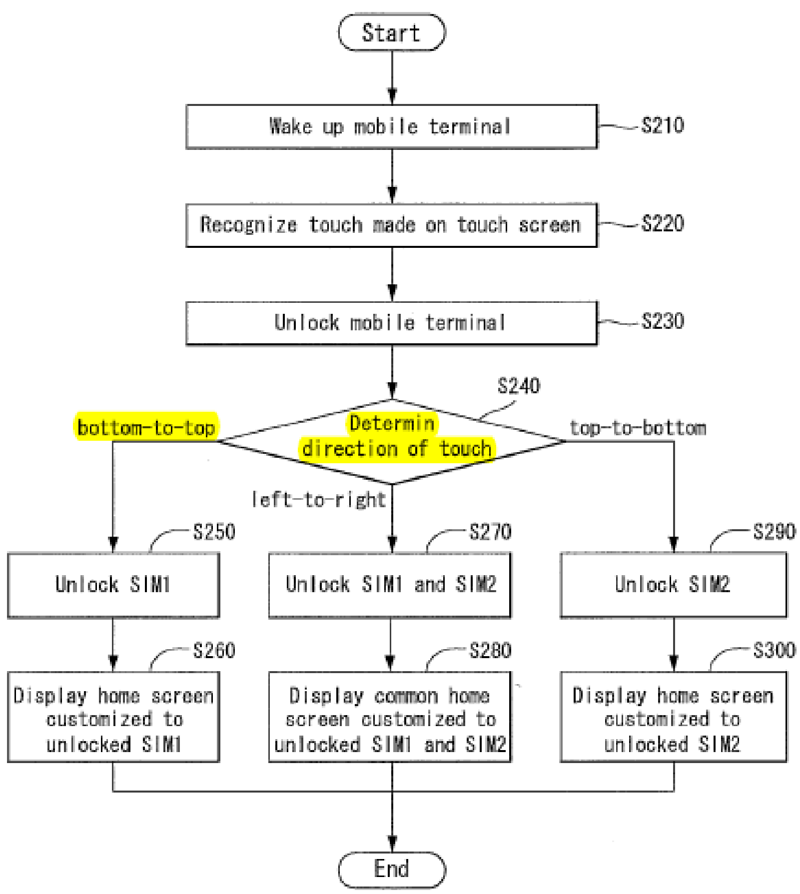


EX1005, Figs. 4(a) (annotated) & 4(b). A POSITA would have understood that the screen shown in Figure 4(a) is a "wake screen user interface." Specifically, the screen is displayed after the device wakes up and, in step S220, it receives user input for unlocking the mobile terminal in step S230. Similar to common prior-art wake screens, the Figure 4(a) wake screen displays some useful information, including, for example, a digital clock and various indicators such as battery and Wi-Fi status. *See, e.g.,* EX1007 at 0:25, 0:40, 1:07, 2:30, 2:59, 3:20, 3:46. EX1003 ¶79.

e. Limitation 1e

Chae discloses "while displaying the wake screen user interface, detecting a first input that is directed to a portion of the wake screen user interface and includes first movement," as required by limitation 1e. Figure 3 illustrates a decision block S240 that determines a "direction of touch."

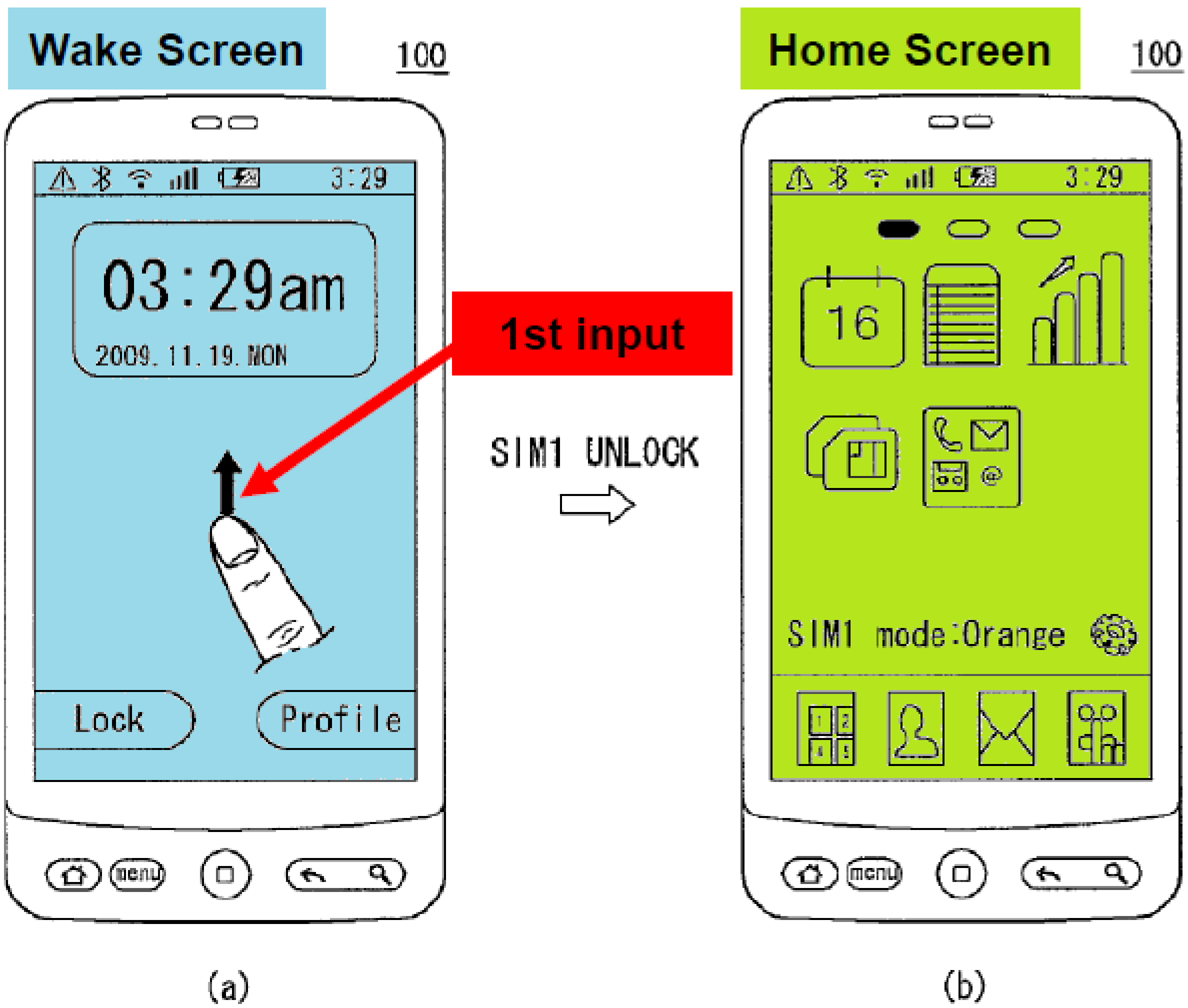
FIG. 3



EX1005, Fig. 3 (annotated). As shown by the left branch out of decision block S240, the "direction of touch" may be a "bottom-to-top" movement. *Id.* As shown below by Figure 4, the specification further explains that the "bottom-to-top" swipe

"unlocks the first SIM" and "displays a home screen customized to the first SIM." *Id.* ¶¶103-104.

FIG. 4

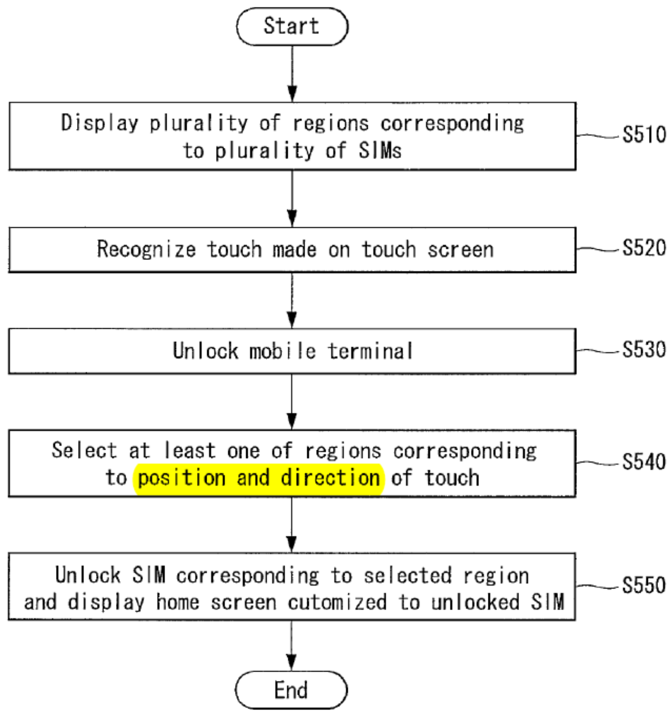


Id., Figs. 4(a) & 4(b) (both annotated). A POSITA would have understood that step S240 of Figure 3 "detect[s] a first input that is directed to a portion of the wake screen user interface and includes first movement." As shown by the text of Figure 3 ("bottom-to-top"), Figure 4, and Paragraph 104, the "first movement" is a swipe in a "bottom-to-top direction." EX1003 ¶80.

A POSITA would have understood that the user makes the bottom-to-top swipe on a "portion of the wake screen user interface." The swipe necessarily must be initiated at a portion of the wake screen located below the top edge of the screen so that the device will be able to detect the upward movement. Therefore, the first input is "directed to a portion of the wake screen user interface." EX1003 ¶81.

The "directed to a portion of the wake screen user interface" claim language does not require the bottom-to-top swipe to occur at a ***predefined*** location on the wake screen. *See supra* II.E.2. But even if the claim language required the bottom-to-top swipe to start at a predefined location on the wake screen, Chae discloses or makes obvious a bottom-to-top swipe at a predefined location on the wake screen. Figure 17 of Chae discloses accessing the home screen based on both the "position and direction" of a gesture:

FIG. 17



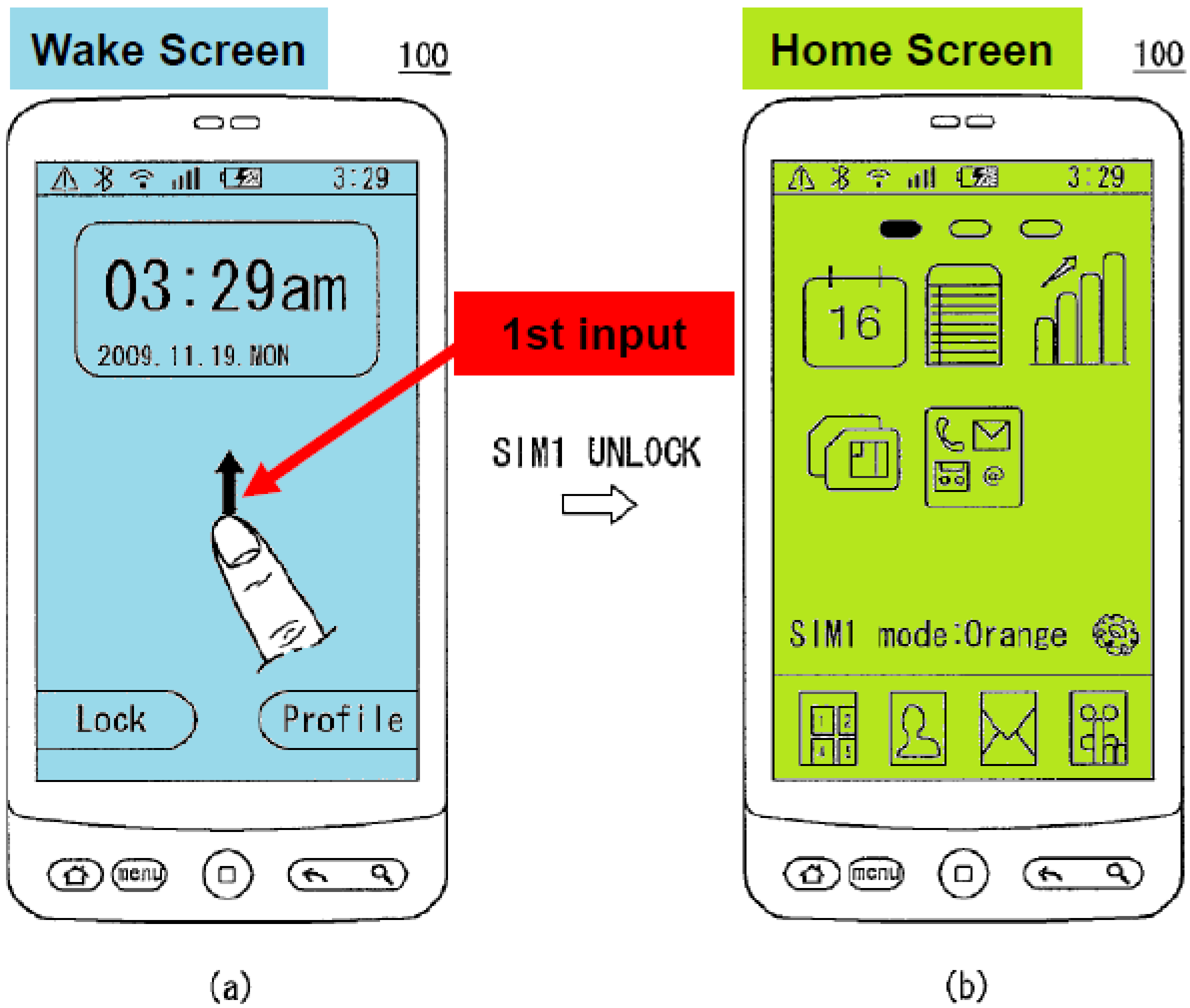
EX1005, Fig. 17 (annotated). A POSITA would have understood that the "position" of the touch refers to a predefined location on the touchscreen associated with the home screen being unlocked. This disclosure is consistent with a well-known and common prior-art user-interface design practice of requiring a gesture to start at a predefined screen location to reduce the likelihood of inadvertent actions. The desire to prevent inadvertent access of the home screen would have motivated a POSITA to design Chae's user interface to require the bottom-to-top swipe to start at or near a predefined location on the wake screen. EX1003 ¶82.

f. Limitation 1f

Chae discloses limitation 1f, which requires, in response to detecting the "first movement" meeting "first criteria" of being in the "first direction," displaying a

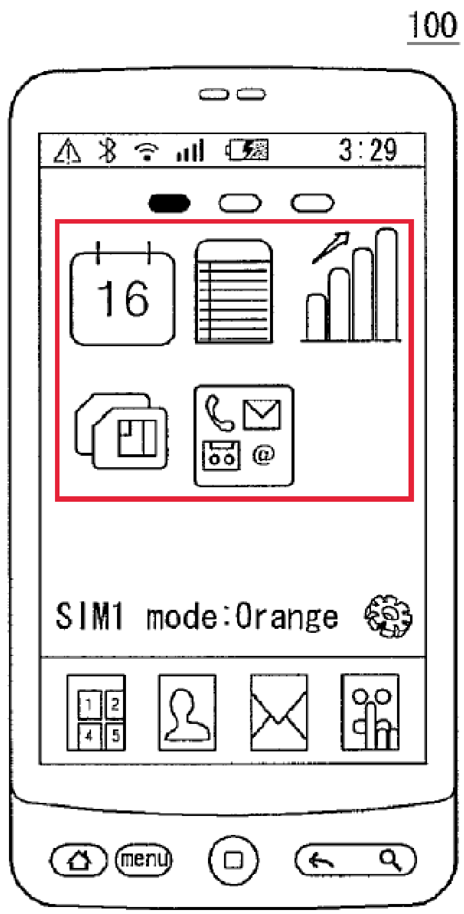
"home screen user interface" with multiple application icons. Figures 4(a) and 4(b) illustrate a bottom-to-top swipe for displaying a home screen:

FIG. 4



EX1005, Figs. 4(a) & 4(b) (both annotated), ¶104. Because, as explained above, the first movement is in a "bottom-to-top direction," the first movement is "in a first direction." Further, as described in Paragraph 104 and shown in Figure 4(b), the first movement causes display of a "home screen user interface that is different from the wake screen user interface, wherein the home screen user interface includes a

plurality of application icons corresponding to different applications." A comparison of Figures 4(a) and 4(b) shows the Figure 4(b) home screen differs from the Figure 4(a) wake screen. And Figure 4(b) depicts a home screen with multiple application icons.



(b)

EX1005, Fig. 4(b) (annotated). Chae discloses that each screen may display "items includ[ing] ***icons*** and widgets." *Id.* ¶100 (emphasis added). Icons and widgets were common and well-understood prior-art GUI features. A POSITA would have understood that "icons," as disclosed by Chae, are "application icons" as claimed

and that GUIs depicted application icons as small, square graphical tiles. A POSITA would immediately recognize the square graphical tiles shown in the red box of annotated figure 4(b) above as application icons. EX1003 ¶83.

Several basic GUI functions were well-known prior-art functions that a POSITA would have understood in view of Chae's disclosure. For example, a POSITA would have understood that each application icon displayed on a GUI screen corresponds to a different application and that selection of the icon causes display of the corresponding application. Therefore, a POSITA would have understood that Chae's disclosure of multiple application icons displayed on Figure 4(b) discloses application icons "corresponding to different applications, and wherein a respective application icon of the plurality of application icons, when selected, causes display of an application corresponding to the respective application icon." EX1003 ¶84.

Narendra further supports that a POSITA would have understood Chae's Figure 4(b) "icons" to be "application icons" as claimed in limitation 1f. Narendra expressly discloses: "Mobile devices with touch sensitive displays typically include a desktop screen that shows icons used to launch applications." EX1006 ¶2. Narendra further discloses that each icon is used to launch a different application:

> Application icons … are used to launch applications. For example, a user might launch a music player application by tapping on icon 330 [or] the user might launch an email application by tapping on icon 332.

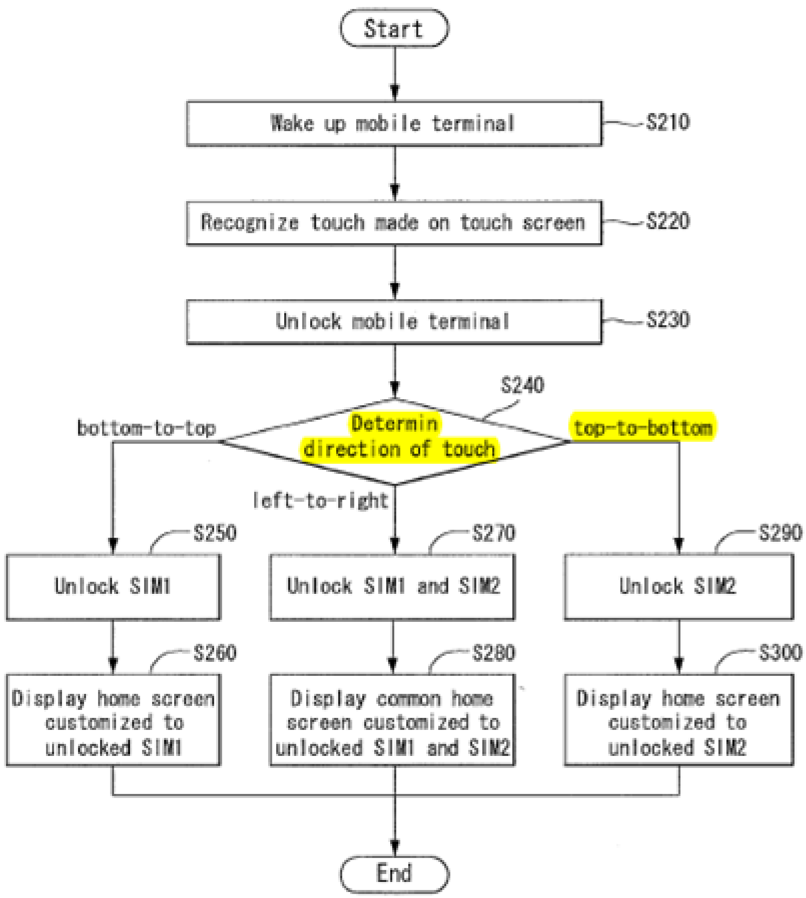
Id. ¶25. This disclosure is not unique to Narendra; it is basic and well-known GUI functionality that selecting an application icon launches a corresponding application. A POSITA would have understood that Chae's icons have this basic functionality of limitation 1f. EX1003 ¶85.

If Chae were somehow interpreted as ***not*** disclosing such basic GUI functionality, it would have been obvious to add it in view of Narendra. Basic GUI design principles and Narendra's teachings would have motivated this modification to ensure that Chae's GUI was fully functional and able to perform the basic functionality of launching a corresponding application when a user selects an icon. EX1003 ¶86.

g. Limitation 1g

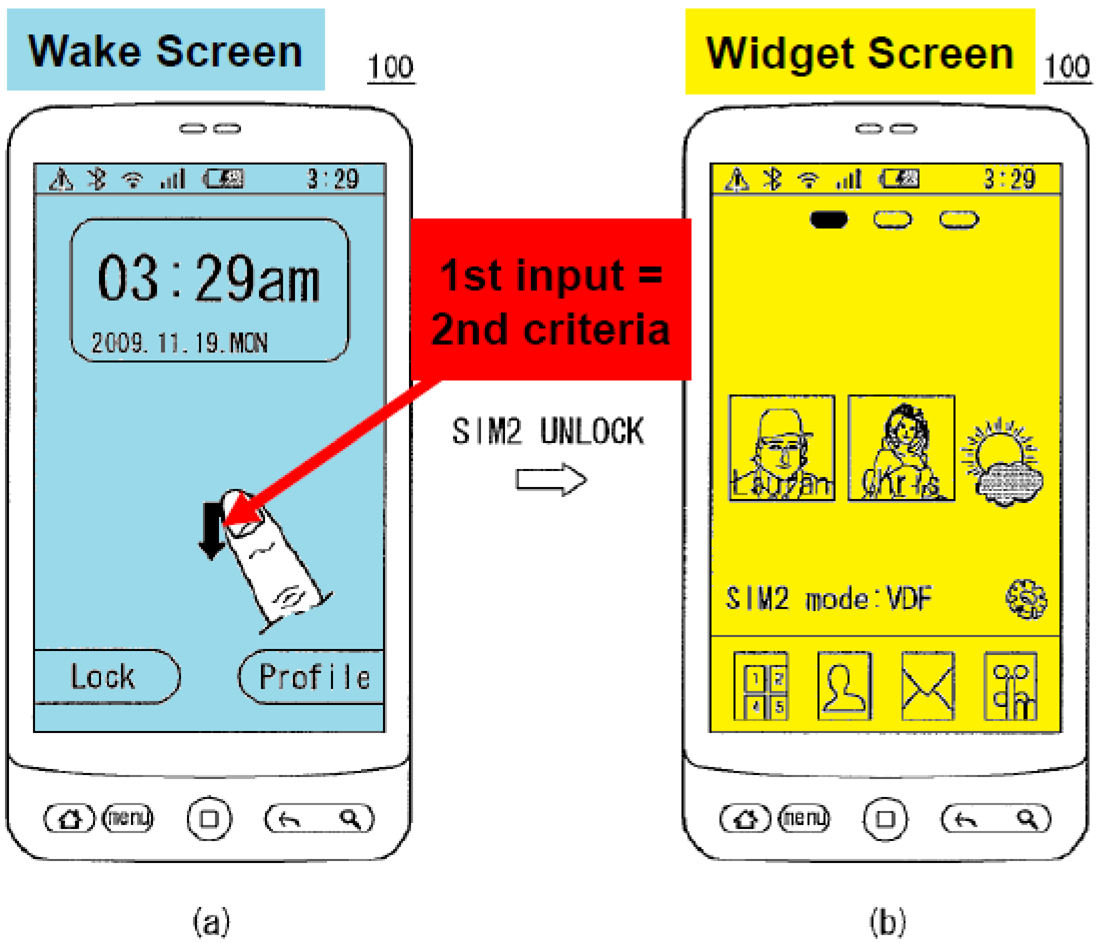
Chae discloses limitation 1g, which requires, in response to detecting the "first movement" in a "second direction that is different from the first direction," displaying a "widget screen user interface" with multiple "user interface objects" containing "application content" from a corresponding application. Figure 3 illustrates a decision block S240 that determines a "direction of touch."

FIG. 3



EX1005, Fig. 3 (annotated). As shown by the right branch out of decision block S240, the "direction of touch" may be a "top-to-bottom" movement. *Id.* As shown by Figure 6 below, the specification further explains that the "top-to-bottom" swipe "unlocks the second SIM" and "displays a home screen customized to the second SIM." *Id.* ¶108.

FIG. 6

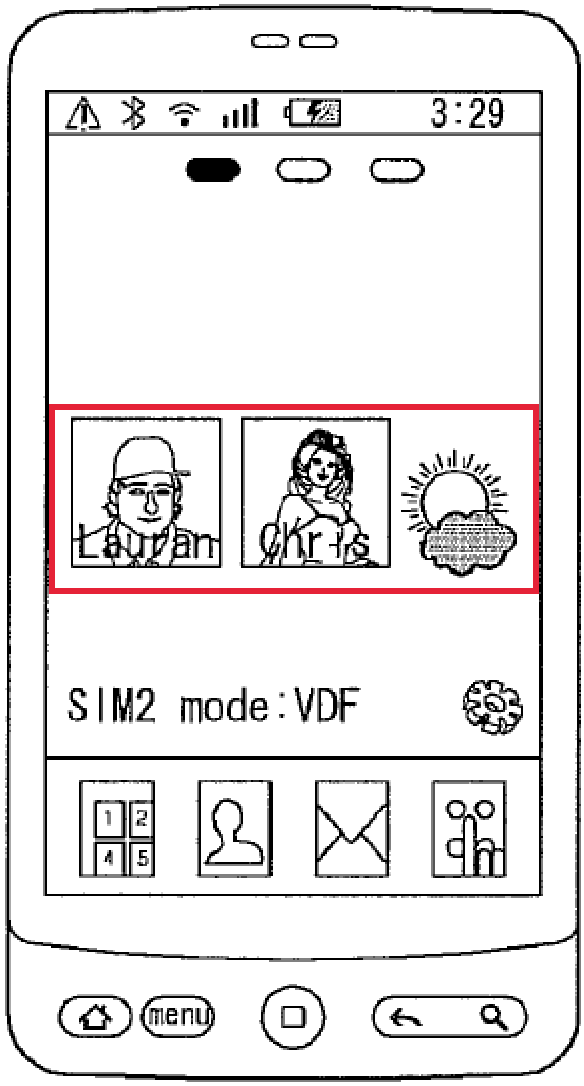


EX1005, Figs. 6(a) & 6(b) (both annotated). A POSITA would have understood that a swipe in a "top-to-bottom direction," as described or shown in Paragraphs 108-109, Figure 6(a), and the text of Figure 3, meets a "second criteria different from the first criteria" where the "first movement" is "in a second direction that is different from the first direction." EX1003 ¶87.

A POSITA would have understood that the Figure 6(b) screen is a "widget screen user interface" as claimed. A "widget screen user interface" is a screen "different from the wake screen user interface and the home screen user interface"

and that "includes a plurality of user interface objects corresponding to different applications, wherein a respective user interface object of the plurality of user interface objects contains application content from an application corresponding to the respective user interface object, and when selected, causes display of an application corresponding to the respective user interface object." *See supra* II.E.1.c. The Figure 6(b) screen meets this definition. A comparison of Figures 4(a), 4(b), (6a), and 6(b) establishes that the Figure 6(b) screen is "different from" ***both*** (1) "the wake screen user interface" (shown in Figures 4(a) and 6(a)) ***and*** (2) the "home screen user interface" (shown in Figure 4(b)). Indeed, Paragraph 109 expressly states the screens are different: "In comparison to the diagram (b) of FIG. 4, the home screen of diagram (b) of FIG. 6 displays different items when the SIM is unlocked." EX1005 ¶109. EX1003 ¶88.

A POSITA would have understood that two or more of the objects on the Figure 6(b) screen are "user interface objects" in which each "contains application content from an application corresponding to the respective user interface object." For example, a POSITA would have understood the three objects shown in the red box below to be "user interface objects" as claimed:

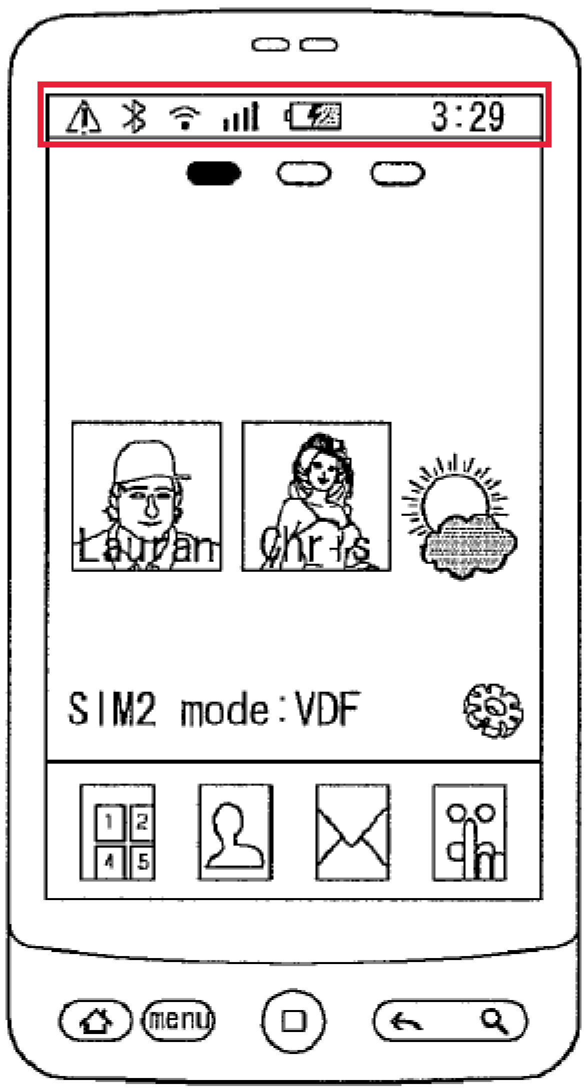


(b)

Id., Fig. 6(b) (annotated). Specifically, the left-most and center objects include images and names of people (Lauran and Chris) and the right-most object includes a graphical depiction of weather conditions (partly cloudy). A POSITA would have understood this information to be "application content from an application corresponding to the respective user interface object." Displaying the images and names of Lauran and Chris would involve retrieving that content from a

corresponding application, such as an image-editing application or an application for managing contacts or profiles. And displaying a graphical depiction of weather conditions would involve retrieving information indicating those conditions from a weather application. EX1003 ¶89.

It also would have been obvious to implement Figure 6(b)'s status bar (shown below in a red box) as multiple widgets.



(b)

Id., Fig. 6(b) (annotated). The status bar shows, from left to right, a warning notification indicator, a Bluetooth indicator, a Wi-Fi indicator, a cellular signal indicator, a battery-level indicator, and a digital clock. A POSITA would have understood that each of these status-bar items provides "application content" (such as, for example, cellular signal strength or time of day) that would need to be retrieved "from an application corresponding to the respective user interface object." EX1003 ¶90.

Similar to icons, widgets were common and well-known elements of prior-art GUIs. One well-known functionality of widgets was displaying "an application corresponding to the respective user interface object" upon selecting a widget. In view of a POSITA's knowledge of this well-known widget functionality, Chae's disclosure, including Figure 6(b), would have conveyed to a POSITA that selecting one of the objects shown in the center of the screen (such as the weather object) or one of the objects on the status bar (such as the digital clock) would cause display of a corresponding application (such as a weather application or a digital clock application). Therefore, a POSITA would have understood that the screen shown in Figure 6(b) is a "widget screen user interface." EX1003 ¶91.

Further, even if Chae did not expressly disclose that the Figure 6(b) screen is a widget screen user interface, it would have been obvious to include widgets on the Figure 6(b) screen, as taught by Paragraph 100:

> Here, the home screen customized to the SIM has items displayed on the home screen different from those on a general home screen. These items include icons and ***widgets***.

EX1005 ¶100 (emphasis added). In addition, Narendra also discloses "[d]esktop screens on mobile device 300 display content such as application icons, ***widgets***, and the like." EX1006 ¶25 (emphasis added). Moreover, Narendra discloses using directional swipe gestures to navigate between different GUI screens, as shown by prior-art Figures 1 and 2:

FIG. 1
PRIOR ART

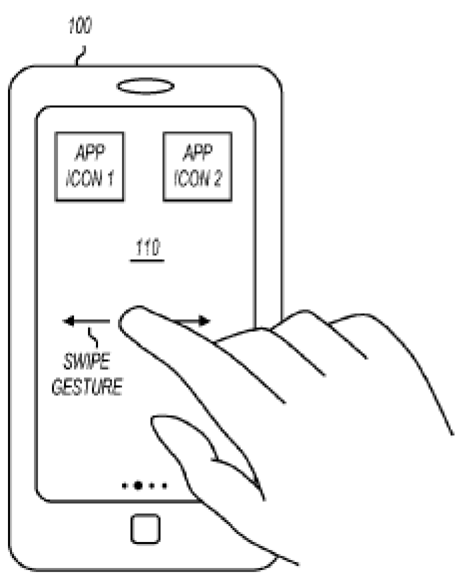
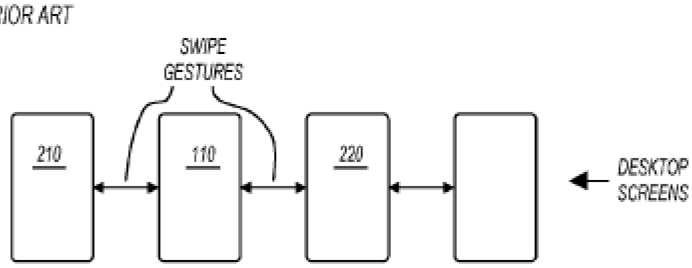


FIG. 2
PRIOR ART



Id., Figs. 1, 2, ¶2 ("Some prior art mobile devices include multiple desktop screens that can be navigated using gestures on the touch sensitive display.") Therefore, in the field of multi-screen GUIs for touchscreen devices, customizing one or more of the GUI screens to include multiple "widgets" was well known. EX1003 ¶92.

A POSITA would have understood, in view of Chae's and Narendra's disclosures, that those references used the term "widget" to refer to a user interface object that displays content generated by an associated application without needing to (but being able to) open the application. Hong, which was filed in 2014 and published in 2015, supports this understanding. Specifically, Hong states:

> Recently, application widgets have been provided that enable a user to access contents provided in an application without executing the application, such as a clock, a calendar, a memo, search, a map, news, a real-time camera, and the like.

EX1010 ¶4.[5] Figure 7A depicts several such widgets on a screen:

[5] Hong is cited here as background of how a POSITA would have interpreted the term "widget."

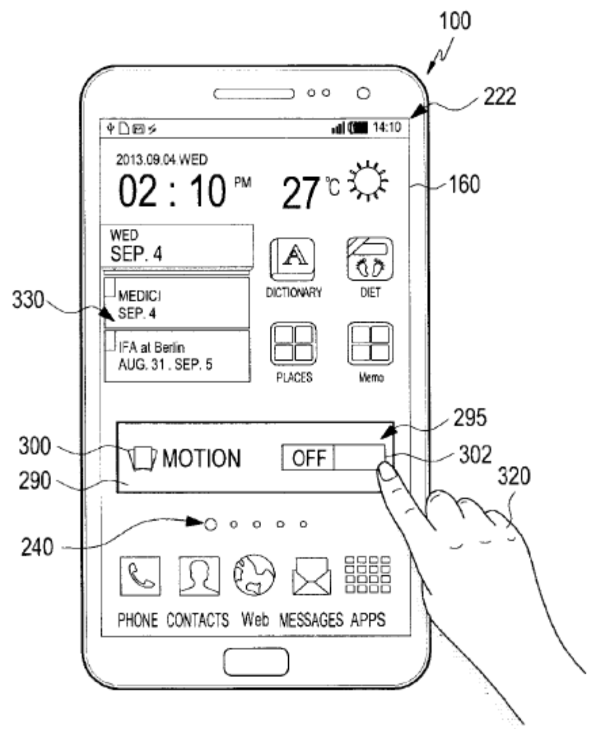
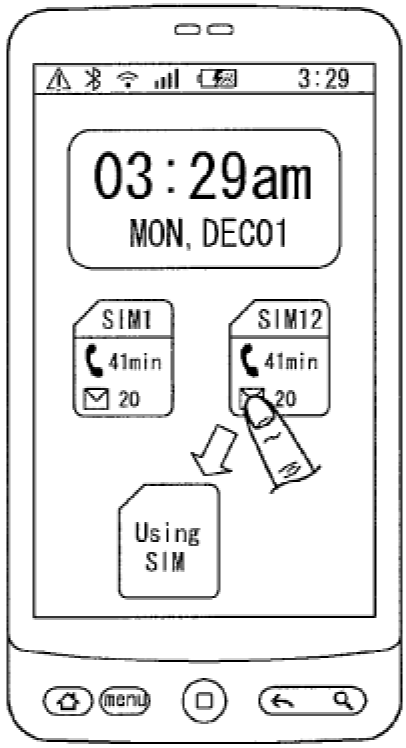


FIG.7A

EX1010, Fig. 7A. Consistent with this description in the prior art, a POSITA would have understood that Chae's and Narendra's disclosures of user-interface screens with multiple "widgets" meet the "widget screen user interface" limitation of claim 1. EX1003 ¶93.

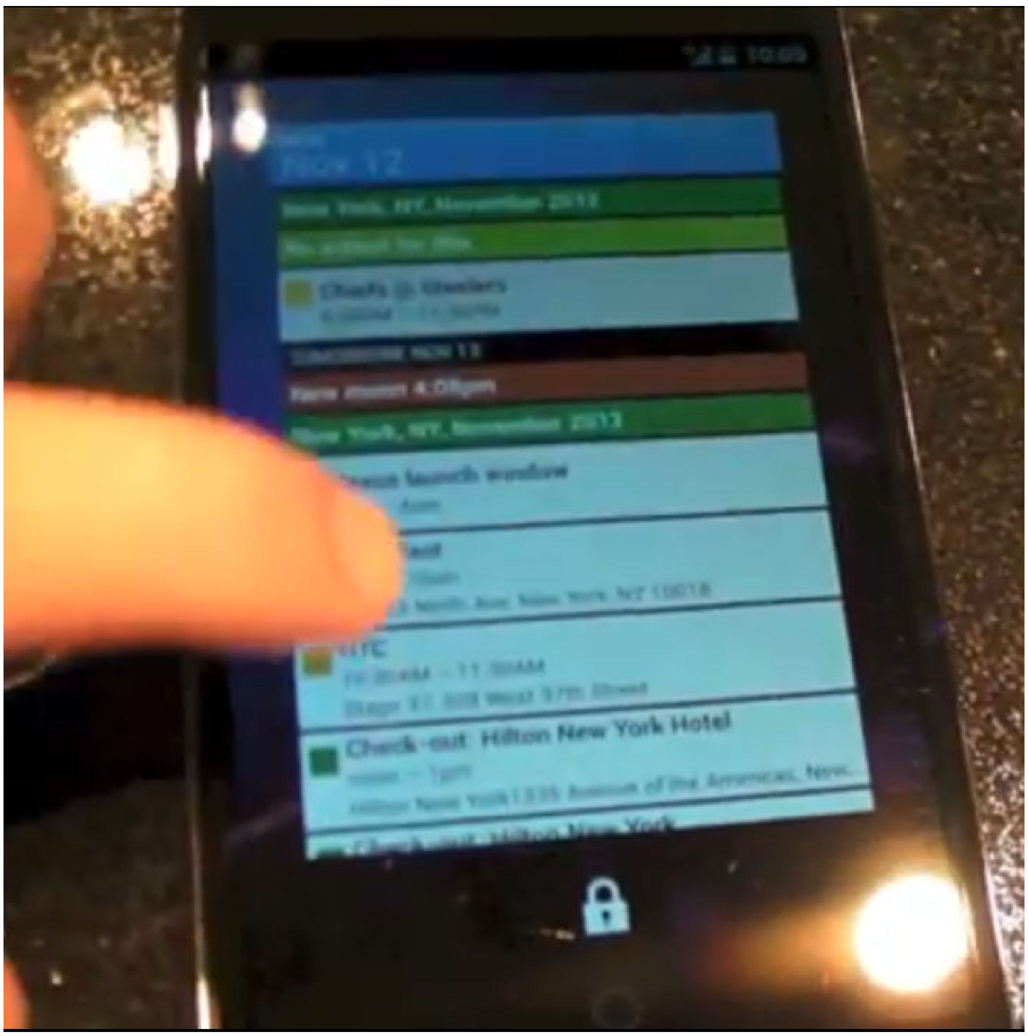
Chae's description related to its Figure 22 embodiment supports that Chae uses the term "widget" to refer to a user interface object that displays content generated by an associated application without needing to (but being able to) open the application. Figure 22 depicts "widgets that show use-state information of the first and second SIMs." EX1005 ¶152.



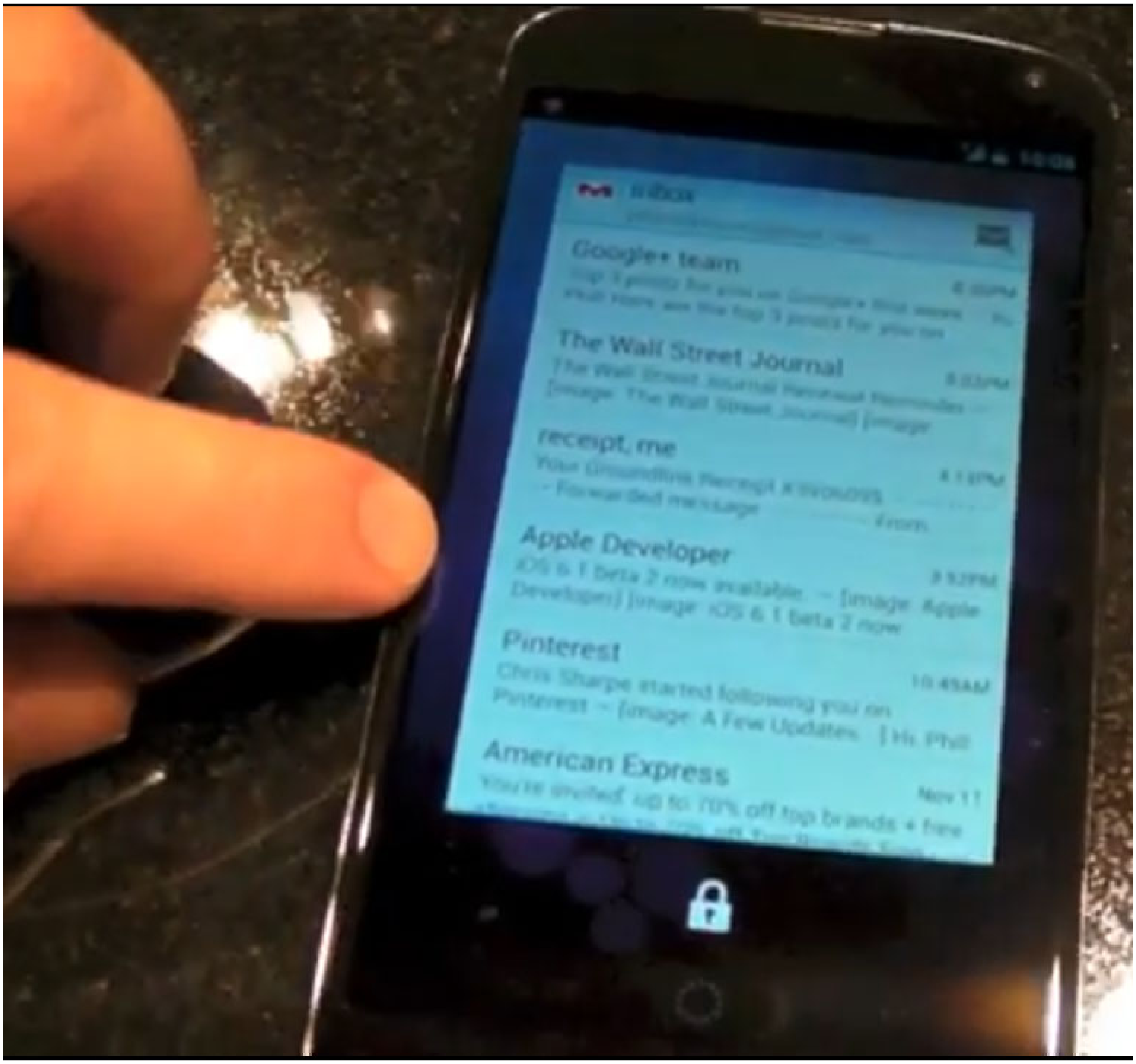
EX1005, Fig. 22. A POSITA would have understood that the referenced "use-state information" includes minutes of talk time associated with each SIM (41 minutes in the illustrated example) and messages associated with each SIM (20 messages in the illustrated example). Thus, the use-state information displayed on each widget is "application content from an application corresponding to the respective user interface object," as recited by claim 1. The illustrated widgets of Figure 22 further support that Chae's disclosure of a screen including multiple widgets satisfies the "widget screen user interface" limitation of claim 1. EX1003 ¶94.

Android further supports that a POSITA would have understood a "widget" to be a user interface object containing application content from an application corresponding to the user interface object. The video repeatedly refers to "widgets"

such as a calendar widget, digital clock widget, email widget, or messaging widget. *See generally* EX1007. The referenced widgets are user interface objects containing content from an application corresponding to the user interface object. The screenshot below shows the calendar widget containing content summarizing scheduled events from a calendar application:



Id. at 1:11. The screenshot below shows an email widget containing content summarizing email messages:



Id. at 2:06. Other examples are shown throughout the video. *See generally id.*[6] EX1003 ¶95.

Alternatively, if Chae is interpreted as not disclosing multiple widgets on its Figure 6(b) screen, a POSITA would have been motivated to add multiple widgets

[6] Android is cited here as further evidence of the meaning of "widget."

to that screen, thereby making it a "widget screen user interface" as claimed. It was well known before the '352 patent that widgets advantageously display useful information generated by applications running in the background, without requiring the user to open the applications. For example, common widgets displayed the date and time of day, weather information such as the local temperature, and financial information such as stock quotes, without requiring the user to open a clock application, weather application, or financial application. The efficiency and convenience of using widgets to view such useful information without needing to open applications would have motivated a POSITA to include multiple widgets on Chae's Figure 6(b) screen. A POSITA would have been motivated specifically to include ***multiple*** widgets (not just one) on a single screen so that as much useful information as possible could be viewed on a single screen without needing to switch between screens. Including multiple widgets on a single screen was a well-known technique of user-interface design to improve the user experience by reducing switching between screens. EX1003 ¶96.

That Chae calls the screen shown in Figure 6(b) a customized home screen does not mean it is not a "widget screen user interface." Chae is not required to use the exact claim phrase "widget screen user interface" for a POSITA to determine that the disclosed Figure 6(b) screen includes multiple widgets, and, thus, satisfies the claim language defining a "widget screen user interface." *See, e.g.*, *In re Bond,*

910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*). EX1003 ¶97.

Further, it is irrelevant that Chae implements the functionality depicted by Figure 3 on a smartphone with two SIM cards. The ’352 patent claims are not limited to single-SIM devices and do not exclude multi-SIM devices. Thus, Apple cannot distinguish the claims from Chae on the basis that Chae uses two SIM cards instead of one. *See In re Roslin Inst. (Edinburgh),* 750 F.3d 1333, 1338 (Fed. Cir. 2014) (unclaimed differences do not support patentability). In any event, Narendra discloses using directional swipe gestures to navigate between multiple GUI screens on a single-SIM smartphone. EX1006, Fig. 16 (single SIM card 1610), ¶25 (application icons and widgets), Figs. 1-3 (navigation using directional swipe gestures). Convenience, efficiency, and ease of use would have motivated a POSITA to implement directional-swipe-gesture navigation, as taught by Chae and Narendra, on either single-SIM or multi-SIM touchscreen devices. EX1003 ¶98.

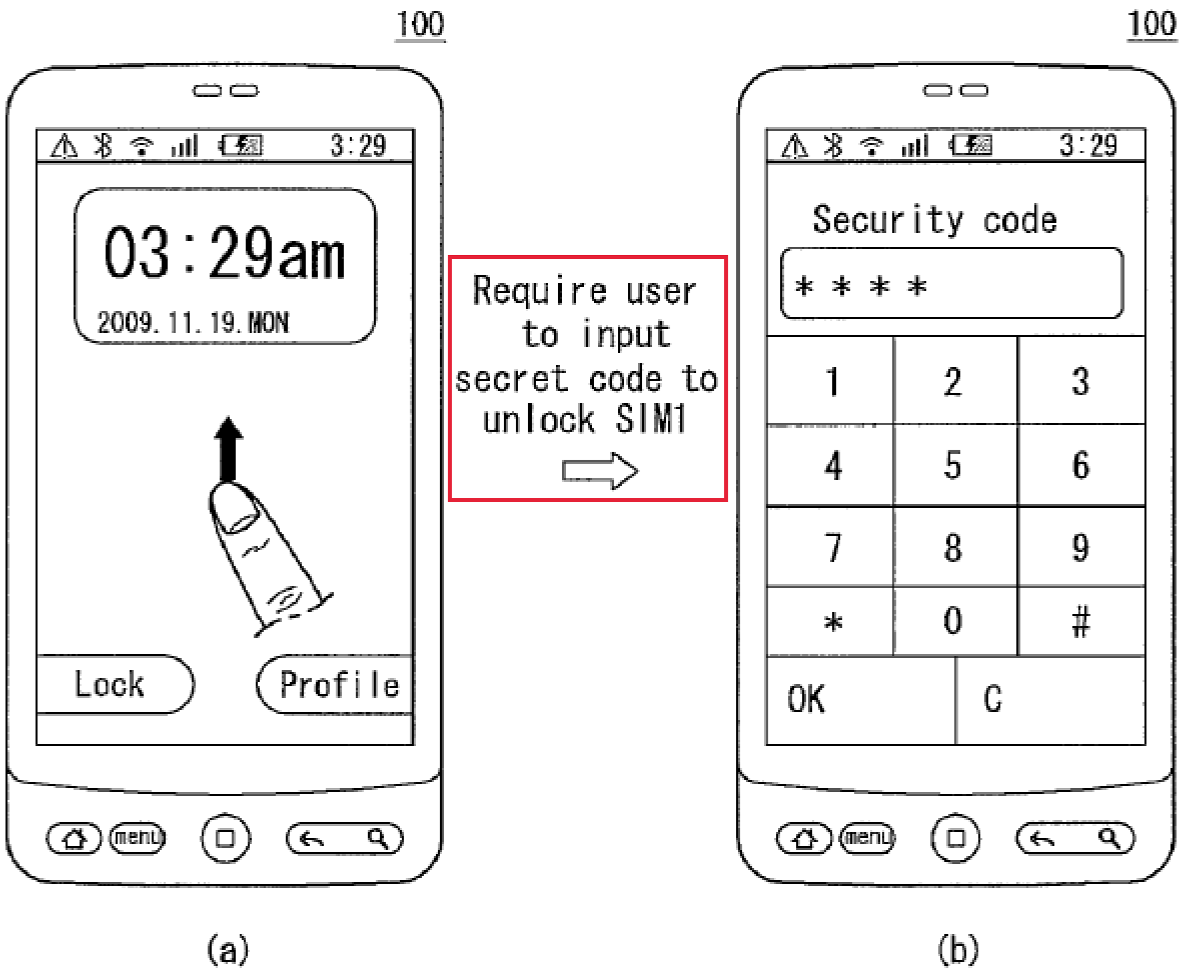
Accordingly, Chae’s Figure 6(b) screen is or makes obvious a “widget screen user interface” as recited in limitation 1g. EX1003 ¶99.

For the foregoing reasons, claim 1 would have been obvious in view of Chae and Narendra. EX1003 ¶100.

2. Claim 2

Claim 2 depends on claim 1 and further recites that the wake screen user interface "has a first state that corresponds to an authenticated state of the computer system and a second state that corresponds to an unauthenticated state of the computer system." Chae discloses this limitation. Specifically, Figure 4 illustrates the "first … authenticated state" and Figure 5 illustrates the "second … unauthenticated state." Both Figures 4 and 5 illustrate a bottom-to-top swipe for unlocking the first SIM. EX1005 ¶¶104-105. Figure 4 does not require additional authentication, showing that the device is already authenticated. *Id.* But Figure 5 requires "inputting a secret code," as shown below.

FIG. 5



Id., Fig. 5 (annotated); *see also id.* ¶106. A POSITA would have understood that inputting a secret code is a form of authentication. EX1003 ¶¶101-102.

Therefore, Figure 4 illustrates the Figure 4(a) wake screen starts out in a "first … authenticated state," while Figure 5 illustrates the Figure 5(a) wake screen starts out in a "second … unauthenticated state." Accordingly, claim 2 would have been obvious. EX1003 ¶¶101-103.

3. Claim 6

Claims 3-6 are dependent claims that merely recite different navigation paths for moving among the same wake, home, and widget screens recited in claim 1 in response to a swipe gesture in a particular direction.[7] A POSITA would have understood these claims' added limitations are trivial and obvious variations of the basic concept of navigating from one user-interface screen to another using directional swipe gestures that both Chae and Narendra disclose. In view of Chae's and Narendra's disclosures, a POSITA would have recognized that directional swipe gestures are an efficient and convenient mechanism for accessing any user-interface screen from any other screen. EX1003 ¶104.

Once a POSITA understood the basic prior-art concept of navigating between screens using directional swipe gestures, the POSITA would have understood that choosing a particular navigational path for moving among the user-interface screens and associating a particular directional swipe gesture with each movement is a simple matter of choosing from a finite number of design choices. For example, for each navigational path (such as from the wake screen to the home screen, from the home screen to the widget screen, etc.) the POSITA would simply need to choose

[7] Claims 3-5 are addressed in Ground 3 below.

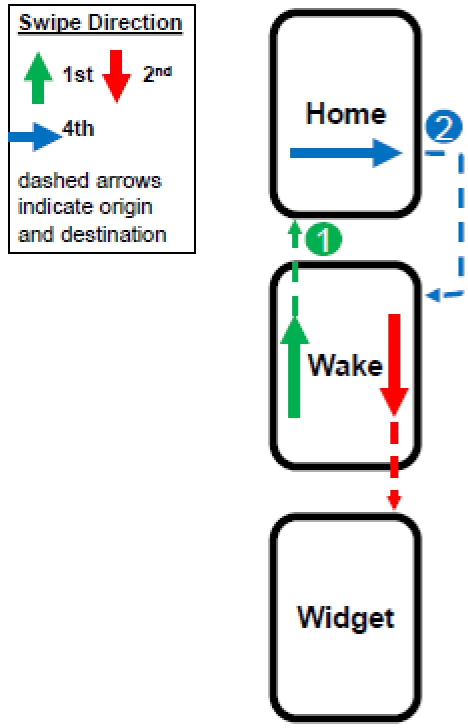
from a finite set of directional swipe gestures (such as swipe left, swipe right, swipe up, swipe down, etc.) to associate with that navigational path. EX1003 ¶105.

A POSITA would have also understood the benefit of permanently associating a specific directional swipe gesture with a particular screen (such as the home screen) such that a user can always use the specific gesture to navigate to the particular screen regardless of the user's origin screen. In addition, a POSITA would have understood the benefit of a context-sensitive navigational system in which the destination screen to which the user navigates in response to a particular directional swipe gesture depends on the origin screen. A POSITA would not have had difficulty combining these approaches by permanently associating a specific directional swipe gesture with the home screen but using a context-sensitive navigational system to navigate among non-home screens. EX1003 ¶106.

Accordingly, it would have been obvious to choose among the finite design choices described above to yield any of the specific navigational paths and associated directional swipe gestures recited by claims 3-6. EX1003 ¶107.

With respect to claim 6, specifically, claim 6 depends on claim 1 and further allows the user to return to the wake screen after navigating to the home screen from the wake screen. Claim 6 recites that the user returns to the wake screen from the home screen by swiping in a different direction than the user swipes to access either

the home screen or the widget screen from the wake screen. Below is a graphical representation of the two-step navigational path of claim 6.[8]

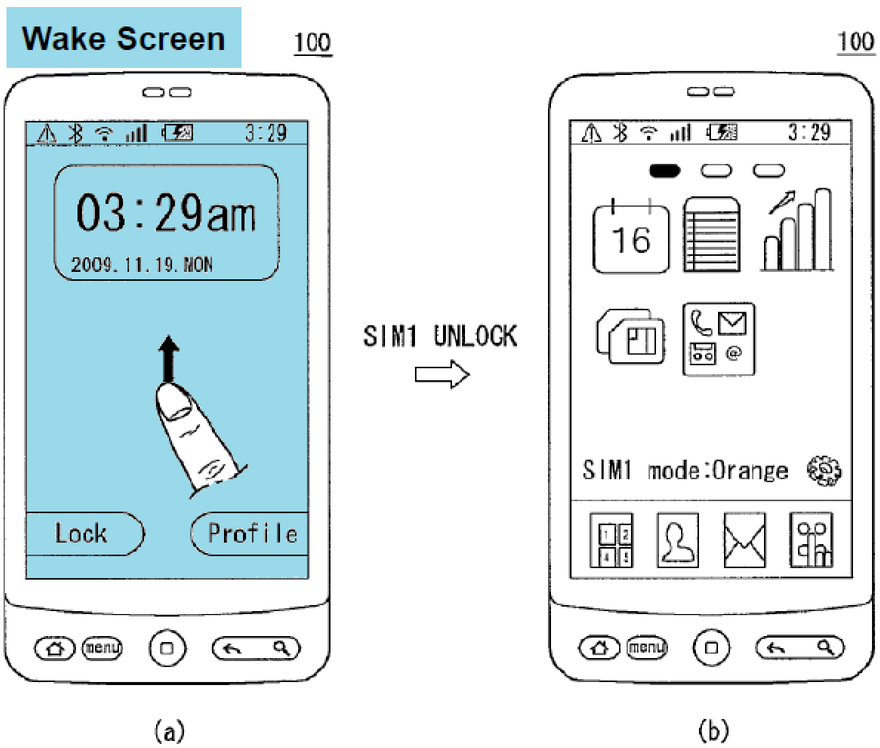


EX1003 ¶108.

[8] The illustrative graphics for claims 3-8 focus on illustrating available navigational paths between various user-interface screens and do not illustrate other claim limitations, which are addressed elsewhere in this Petition. Further, the graphics illustrate ***general*** concepts, not a ***precise*** navigational map required by the claims. For example, the solid arrows in the graphic above are meant to illustrate that the first, second, and fourth directions are ***different*** from each other, ***not*** that they must be a bottom-to-top swipe, a top-to-bottom swipe, and a left-to-right swipe.

It would have been obvious to allow the user to return to the wake screen to lock the smartphone. As shown by Chae's Figure 4(a), the smartphone is or may be locked while on the wake screen.

FIG. 4



EX1005, Figs. 4(a) (annotated) & 4(b). The enhanced security of locking the smartphone would have motivated a POSITA to allow the user to return to the wake screen. However, because a wake screen generally has much more limited functionality than a home screen or widget screen, a POSITA would have been motivated to provide, and would reasonably have expected success in providing, a ***different*** directional swipe gesture for returning to the wake screen than used to access the home screen or widget screen, to reduce the likelihood of user confusion

or inadvertent access of the wake screen. This directional swipe gesture satisfies the claim language of a "fifth input that is directed to a portion of the home screen" and includes "fifth movement" in a "fourth direction" meeting "sixth criteria" of being "different from the first direction and the second direction." EX1003 ¶109.

4. Claim 9

Claim 9 is essentially the same as claim 1 in the form of a computer system with a processor that executes instructions stored in memory to perform the method of claim 1. Claim 9 would have been obvious in view of Chae and Narendra. EX1003 ¶111.

a. Limitation 9a (preamble)

The preamble recites a "computer system." Chae discloses that its invention "can be implemented in a computer or similar device readable recording medium using software, hardware or a combination thereof." EX1005 ¶89. EX1003 ¶112.

b. Limitation 9b1

Chae discloses the claimed "display generating component and one or more input devices." *See supra* V.A.1.b. EX1003 ¶113.

Limitation 9b1 also recites "one or more processors." Chae discloses that its invention "can be implemented using … ASICs, … DSPs," or other types of "processors." EX1005 ¶90. Chae generally calls the processor "the controller 180." *Id.* EX1003 ¶114.

Accordingly, Chae discloses limitation 9b1. EX1003 ¶115.

c. Limitation 9b2

Chae discloses that its "procedures or functions can be implemented" using "software codes" that can be "stored in the memory 160 and executed by the controller 180." EX1005 ¶91. A POSITA would have understood that the disclosed "software codes" are "instructions" as claimed. EX1003 ¶116.

Accordingly, Chae discloses limitation 9b2. EX1003 ¶117.

d. Limitations 9c-9g

Limitations 9c through 9g are identical to limitations 1c through 1g, which Chae and Narendra disclose. *See supra* V.A.1.c-V.A.1.g. EX1003 ¶118.

5. Claim 17

Claim 17 is essentially the same as claim 1 in the form of a computer-readable storage medium comprising instructions that, when executed by a processor, perform the method of claim 1. Claim 17 would have been obvious in view of Chae and Narendra. EX1003 ¶120.

a. Limitation 17a (preamble)

The preamble recites a "computer-readable storage medium." Chae discloses that its invention "can be implemented in a computer or similar device readable recording medium using software, hardware or a combination thereof." EX1005 ¶89. EX1003 ¶121.

b. Limitation 17b

Chae discloses the claimed "display generating component and one or more input devices." *See supra* V.A.1.b. EX1003 ¶122.

Limitation 17b also recites "instructions, the instructions, when executed by one or more processors … cause the processors to perform the operations." Chae discloses that its invention "can be implemented using … ASICs, … DSPs," or other types of "processors." EX1005 ¶90. Chae generally calls the processor "the controller 180." *Id.* Chae discloses that its "procedures or functions can be implemented" using "software codes" that can be "stored in the memory 160 and executed by the controller 180." EX1005 ¶91. A POSITA would have understood that the disclosed "software codes" are "instructions" as claimed. EX1003 ¶123.

Accordingly, Chae discloses limitation 17b. EX1003 ¶124.

c. Limitations 17c-17g

Limitations 17c through 17g are identical to limitations 1c through 1g, which Chae and Narendra disclose. *See supra* V.A.1.c-V.A.1.g. EX1003 ¶125.

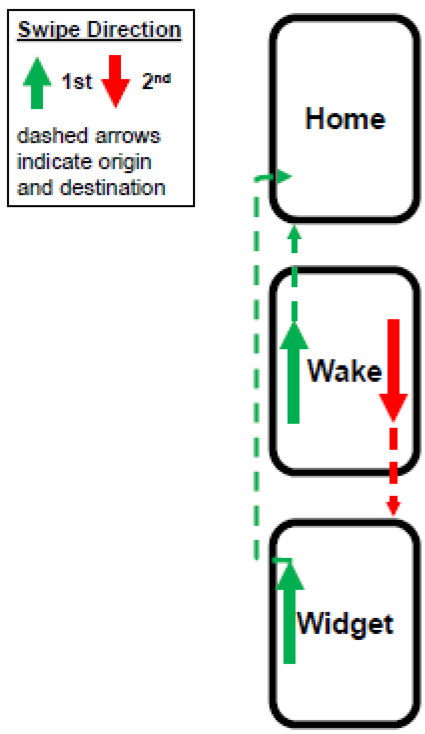
6. Claims 10, 14, 18, and 22

Claims 10 and 14 and 18 and 22 are identical to claims 2 and 6 except they depend directly or indirectly on claims 9 or 17 instead of claim 1. Therefore, for the same reasons as claims 1, 2, 6, 9, and 17, claims 10, 14, 18, and 22 would have been obvious. *See supra* V.A.1-V.A.5. EX1003 ¶127.

B. Ground 2: Claims 3-5, 11-13, and 19-22 would have been obvious in view of Chae, Narendra, and Shuttleworth.

1. Claim 3

Claim 3 depends on claim 1 and further recites navigating to the home screen from the widget screen by swiping in the same direction that the user swipes to access the home screen from the wake screen. Below is a graphical representation of the available navigational paths for claim 3.



As explained above, claim 1 would have been obvious in view of Chae and Narendra. In addition, it would have been obvious in further view of Shuttleworth to allow the user to access the home screen from the widget screen ***using the same directional swipe gesture that the user would use to access the home screen from the wake screen***. EX1003 ¶128.

Shuttleworth discloses using a consistent directional swipe gesture to access the home screen from any other screen, thereby replacing hardware or virtual home buttons:

> Because the Home screen can be reached so readily by a swipe from the left edge of the phone, there is no need for a dedicated hardware Home button, unlike iOS, or soft button as in Android.

EX1008 ¶353. Shuttleworth further explains:

> In one implementation, the swipe is a long swipe in from the left edge; a commit gesture (e.g. a release) after the home screen appears causes the home screen to be displayed after the commit.

Id. ¶359.[9] And Shuttleworth does not limit the swipe as necessarily coming from the left edge, also disclosing that "a swipe in from ***an*** edge brings up a home screen." *Id.* ¶358 (emphasis added). EX1003 ¶129.

Consistent with Shuttleworth's teaching, a POSITA would have understood that providing the user a consistent mechanism to access the home screen from any other screen was a well-known and accepted user-interface design practice for

[9] That the swipe is followed by a "commit gesture (e.g. a release)" does not differentiate the swipe from the "second input" of claim 3. Claim 3's open-ended recitation that the "second input … ***includes*** second movement" allows the input to also include a commit gesture.

enhancing efficiency and ease of use. Consistent with this well-known practice and Shuttleworth's disclosure, a POSITA would have known that prior-art smartphones typically included a binary, dedicated mechanism, such as a physical or virtual home button, for accessing the home screen from any other screen. Using a consistent directional swipe gesture to access the home screen, whether from the wake screen or a widget screen, would have been an obvious substitute for a physical or virtual home button. A POSITA would have understood that using a consistent directional swipe gesture to access the home screen enhances ease of use, efficiency, and convenience by allowing the user to learn a single gesture for accessing the home screen. Therefore, a POSITA would have been motivated to allow the user to access the home screen from the widget screen using the same directional swipe gesture that the user would use to access the home screen from the wake screen, as recited by claim 3. EX1003 ¶130.

Further, a POSITA would have reasonably expected success in making such modification. There would have been no technical obstacle to configuring Chae or Narendra to allow the user to access the home screen from the widget screen using the same directional swipe gesture that the user would use to access the home screen from the wake screen. Indeed, a POSITA would have understood that all gestures, including directional swipe gestures, are easily configurable to be associated with any action, such as navigating between different screens, that can be triggered by a

gesture. For example, a prior-art patent application discloses allowing users "to define and modify mappings between (1) gestures and (2) actions performed by one or more computing devices in response to a device detecting performance of a gesture." EX1009, Abstract. This disclosure of user-modifiable mappings between gestures and actions demonstrates the technical ease of configuring Chae or Narendra to allow the user to access the home screen from the widget screen using the same directional swipe gesture that the user would use to access the home screen from the wake screen.[10] This directional swipe gesture satisfies the claim language of a "second input that is directed to a portion of the widget screen" and includes "second movement" meeting "third criteria" of being "in the first direction." EX1003 ¶131.

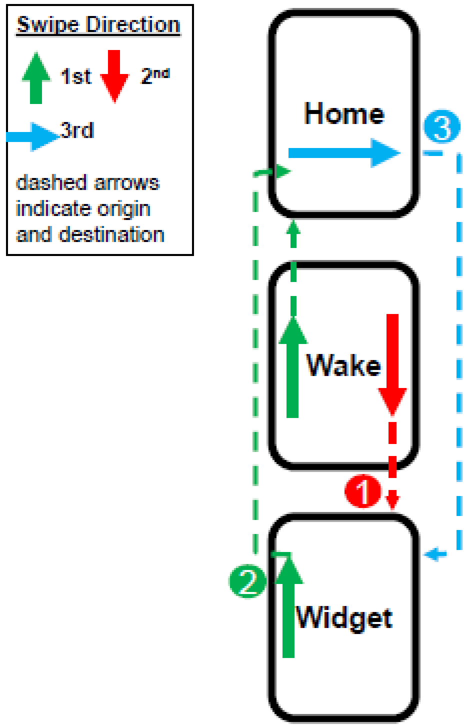
Accordingly, claim 3 would have been obvious in view of Chae, Narendra, and Shuttleworth. EX1003 ¶132.

2. Claim 4

Claim 4 depends on claim 3 and further recites returning to the widget screen from the home screen (after navigating to the home screen from the widget screen per claim 3) by swiping in a different direction than the user swipes to access either

[10] The de Sa publication is cited herein to support motivation to combine and reasonable expectation of success.

the home screen or the widget screen from the wake screen. Below is a graphical representation of the three-step navigational path of claim 4.



EX1003 ¶133.

Claim 4 would have been obvious in view of Chae and Narendra. For the same reasons explained above, a POSITA would have been motivated by efficiency and convenience to allow a user to return to the widget screen after accessing the home screen using a directional swipe gesture. *See supra* V.A.3, V.B.1. In addition, a POSITA would have been motivated to allow the user to return to the widget screen from the home screen ***using a different directional swipe gesture than the user would use to access either the home screen or the widget screen from the wake screen***. EX1003 ¶¶134-135.

As explained above, it was common to provide a dedicated directional swipe gesture, as a substitute for a physical or virtual home button, for navigation to the ***home*** screen. However, for ***non-home*** screens, it was common to provide a context-sensitive navigational system, in which the destination screen to which the user navigates in response to a particular directional swipe gesture depends on the origin screen. Narendra illustrates such a navigational system in Figure 9:

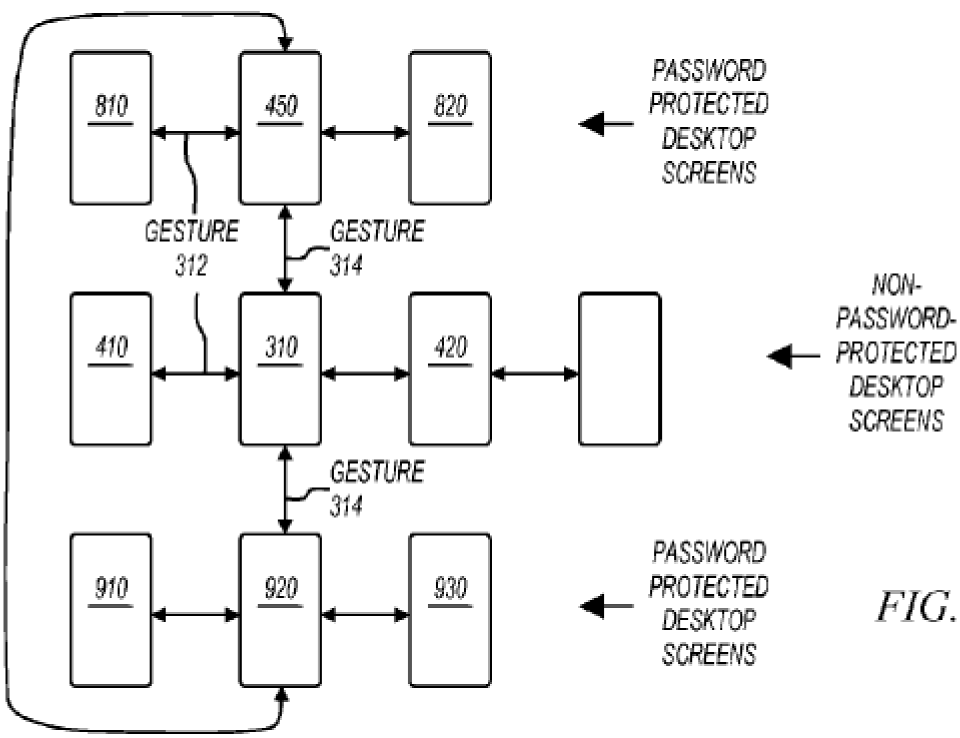


FIG. 9

EX1006, Fig. 9. As shown, a user would swipe right from screen 410 to navigate to screen 310, but would swipe left from screen 420, down from screen 450, or up from screen 920 to navigate to the same screen 310. Therefore, before the '352 patent, smartphone users would have been familiar with navigating to a non-home

destination screen by swiping in one direction from one origin screen but swiping in a different direction from a different origin screen. A POSITA would have understood that such a navigational system is easy to learn and use because, as explained above, it is consistent with a familiar mental model of the current screen being part of a larger "map" with additional screens located to the left, right, up, or down. A POSITA would have also understood that this navigational system would scale easily to provide quick, efficient, and easy access to as many screens as desired because it does not require assigning a dedicated directional swipe gesture to every screen. Providing a familiar user experience for quickly, efficiently, and easily accessing multiple screens would have motivated a POSITA to configure Chae or Narendra to allow a user to navigate to the widget screen from the wake screen by swiping in one direction but to navigate to the widget screen from the home screen by swiping in a different direction, as recited by claim 4. EX1003 ¶136.

This motivation for claim 4 is consistent with the POSITA's motivation to configure Chae and Narendra to provide access to the home screen using a consistent directional swipe gesture per claim 3. While recognizing the efficiency of providing direct access to a commonly accessed home screen using a dedicated directional swipe gesture (as a replacement for a home button), a POSITA would have understood that providing such direct access to multiple screens would be

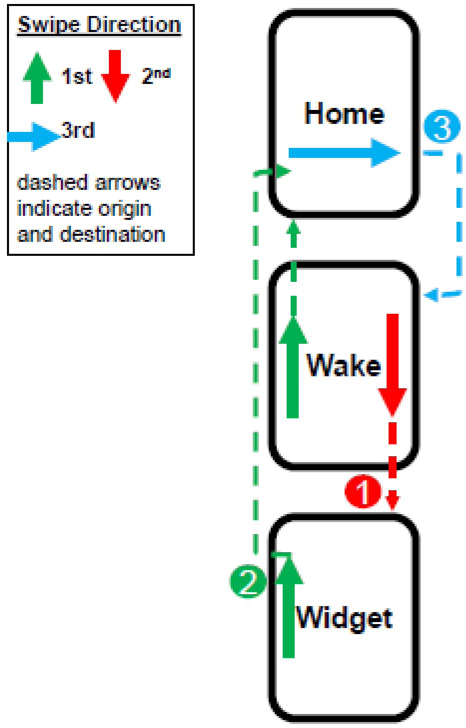
logistically difficult and would not scale well because each directly accessible screen would require its own dedicated directional swipe gesture. EX1003 ¶137.

Further, as discussed for claim 3, there would have been no technical obstacle to, and a POSITA would have reasonably expected success in, configuring Chae or Narendra in accordance with claim 4. *See supra* V.B.1.[11] The directional swipe gesture in such configuration satisfies the claim language of a "third input that is directed to a portion of the home screen" and includes a "third movement" in a "third direction" meeting "fourth criteria" of being "different from the first direction and the second direction." Thus, claim 4 would have been obvious. EX1003 ¶¶138-139.

3. Claim 5

Claim 5 depends on claim 3 and further recites navigating to the wake screen from the home screen (after navigating to the home screen from the widget screen per claim 3) by swiping in a different direction than the user swipes to access either the home screen or the widget screen from the wake screen. Below is a graphical representation of the three-step navigational path of claim 5.

[11] *See* footnote 10.



EX1003 ¶140.

Claim 5 is essentially the same as claim 4 except the user navigates from the home screen to the wake screen instead of to the widget screen. Simply navigating to a different screen is not a patentable distinction. Thus, as discussed for claims 3 and 4, claim 5 would have been obvious. *See supra* V.B.1-V.B.2. The directional swipe gesture in this configuration satisfies the claim language of a "fourth input that is directed to a portion of the home screen" and includes "fourth movement" in a "third direction" meeting "fifth criteria" of being "different from the first direction and the second direction." EX1003 ¶¶141-142.

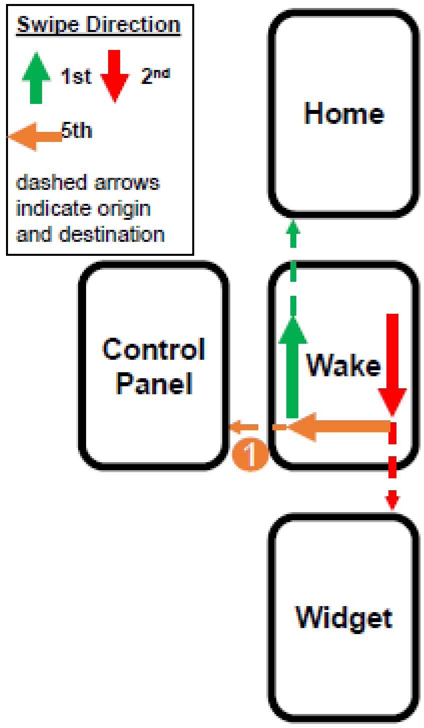
4. Claims 11-13 and 19-21

Claims 11-13 and 19-21 are identical to claims 3-5 except they depend directly or indirectly on claims 9 or 17 instead of claim 1. Therefore, as with claims 3-5, claims 11-13 and 19-21 would have been obvious in view of Chae, Narendra, and Shuttleworth. *See supra* V.B.1-V.B.3. EX1003 ¶¶143.

C. Ground 3: Claims 7, 8, 15, 16, 23, and 24 would have been obvious in view of Chae, Narendra, and Karunamuni.

1. Claim 7

Claim 7 depends on claim 1 and further recites navigating from the wake screen to a control panel by swiping in a different direction than the user swipes to access either the home screen or the widget screen from the wake screen. Below is a graphical representation of the navigational path of claim 7.



EX1003 ¶144.

Karunamuni discloses a smartphone control center that is a "control panel" as claimed.

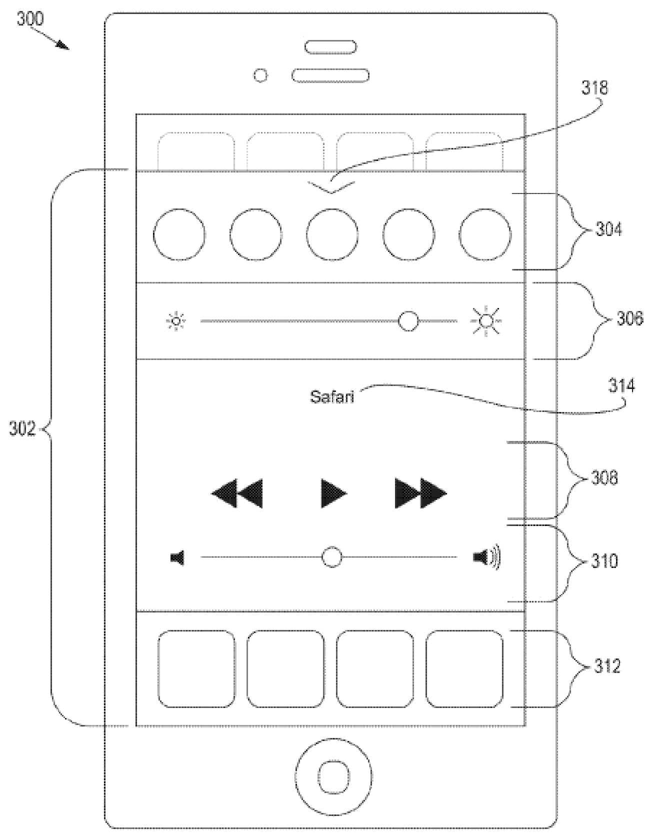


FIG. 3

EX1011, Fig. 3. Karunamuni describes the controls:

> As shown, slider 306 is operable to change the brightness of the display of the mobile device. Slider 310 is operable to change the volume of the sound output of the mobile device.

Id. ¶17. Thus, a POSITA would have understood that the disclosed control center is a "control panel user interface that is different from the wake screen user interface and the widget screen user interface" and "includes a plurality of controls for controlling one or more device functions of the computer system." EX1003 ¶145.

Figure 13 discloses accessing the control center from "the lock screen" using a directional swipe gesture.

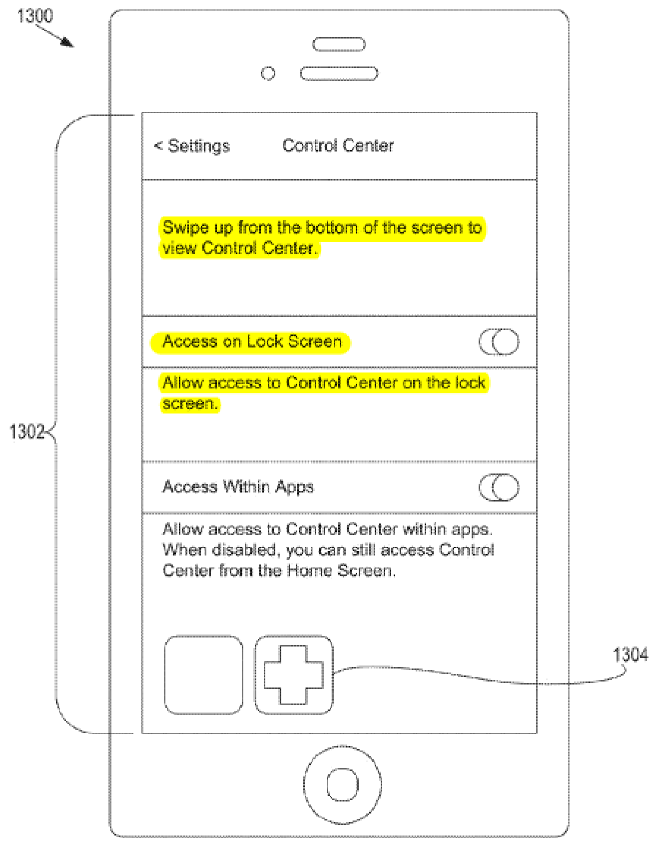
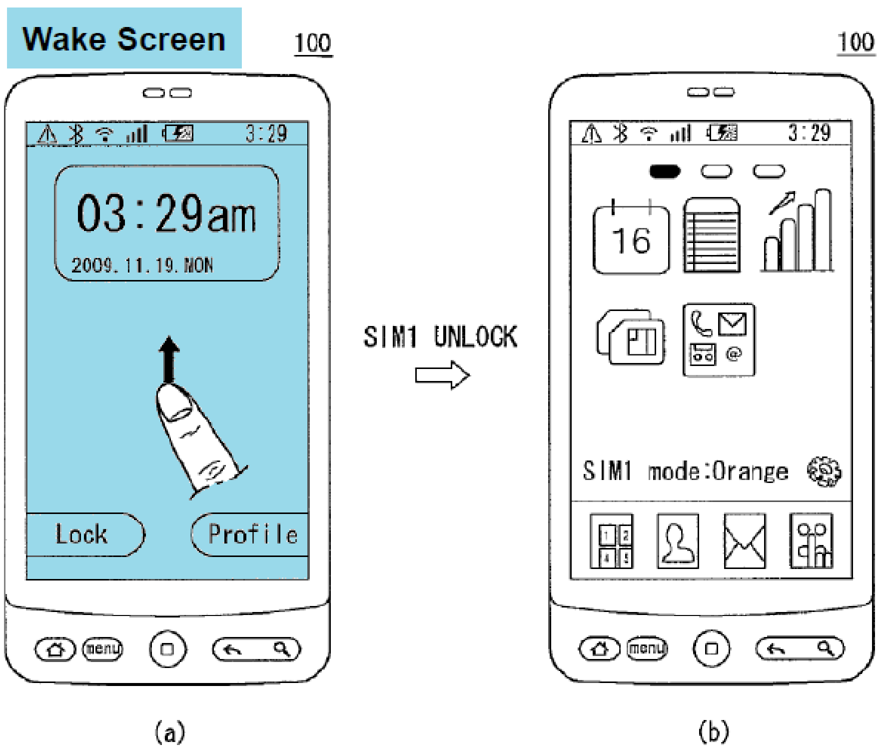


FIG. 13

Id., Fig. 13 (annotated). A POSITA would have understood that a "lock screen," as disclosed by Karunamuni, was typically also a "wake screen," as claimed, because, typically, a device is in a locked state upon waking up, and, thus, the wake screen the user interacts with upon the device waking up is the lock screen. Indeed, as explained above and illustrated below, Chae's wake screen is a lock screen upon

which the user may perform a swipe gesture to unlock a SIM and navigate to a different screen.

FIG. 4



EX1005, Figs. 4(a) (annotated) & 4(b). Accordingly, Karunamuni either discloses, or at least makes obvious, accessing the control center from the wake screen using a directional swipe gesture. EX1003 ¶146.

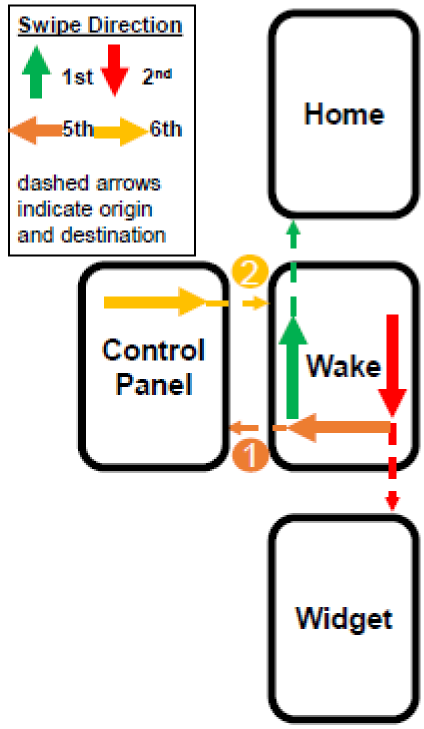
Figure 13 specifically discloses swiping "up from the bottom of the screen to view Control Center." EX1011, Fig. 13. As explained above, Chae discloses swiping in the same "bottom-to-top" direction to navigate from the wake screen to the home screen. However, a POSITA would have understood that a properly functioning GUI would unambiguously associate each gesture-invokable GUI action

with a unique gesture. A POSITA would have also understood that associating gestures that are too similar to each other with different GUI actions should be avoided to reduce the risks of user confusion and unintentional invocation of GUI actions. Accordingly, to enhance ease of use and reduce the possibility of unintentional invocation of GUI actions, a POSITA would have been motivated to allow the user to navigate to the control center from the wake screen by swiping in a direction different from those used to navigate to the home screen or the widget screen from the wake screen. Such directional swipe gesture satisfies the claim language of a "first input that is directed to the portion of the wake screen" and includes "first movement" in a "fifth direction" meeting "seventh criteria" of being "different from the first direction and the second direction." EX1003 ¶147.

Therefore, claim 7 would have been obvious in view of Chae, Narendra, and Karunamuni. EX1003 ¶148.

2. Claim 8

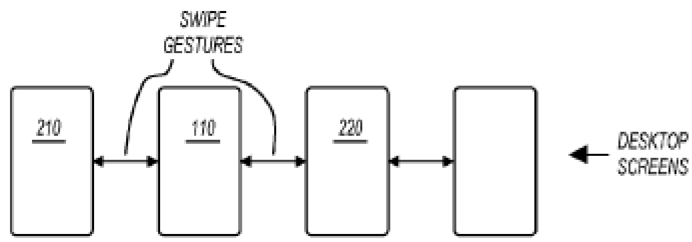
Claim 8 depends on claim 7 and further recites returning to the wake screen from the control panel by swiping in the opposite direction from that used to navigate from the wake screen to the control panel. Below is a graphical representation of the two-step navigational path of claim 8.



EX1003 ¶149.

Claim 8 would have been obvious in view of Chae, Narendra, and Karunamuni. It would have been intuitive to a POSITA (and to smartphone users generally) that, if swiping in one direction results in moving from an origin screen to a destination screen, then swiping in the opposite direction should result in moving from the destination screen back to the origin screen. Indeed, the traditional navigational path illustrated by Narendra's prior-art Figure 2 behaves in this intuitive manner.

FIG. 2
PRIOR ART



EX1006, Fig. 2. As shown, a user starting at screen 110 would swipe right to navigate to screen 220 and would then swipe left (the opposite direction) to navigate back to screen 110. EX1003 ¶150.

Accordingly, to enhance ease of use and provide an intuitive user experience, a POSITA would have been motivated to allow the user to return to the wake screen from the control panel by swiping in the opposite direction from that used to navigate from the wake screen to the control panel, as recited by claim 8. Such directional swipe gesture satisfies the claim language of a "sixth input that is directed to a portion of the control panel" and includes "sixth movement" in a "sixth direction" meeting "eighth criteria" of being "opposite the fifth direction." Claim 8, therefore, would have been obvious in view of Chae, Narendra, and Karunamuni. EX1003 ¶151.

3. Claims 15, 16, 23, and 24

Claims 15, 16, 23, and 24 are identical to claims 7 and 8 except that they depend directly or indirectly on claims 9 or 17 instead of claim 1. Therefore, as with

claims 1, 7, 8, 9, and 17, claims 15, 16, 23, and 24 would have been obvious. *See supra* V.A.1, V.A.4-V.A.5, V.C.1-V.C.2. EX1003 ¶152.

D. Ground 4: Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae and Narendra and further in view of Hong and/or Android.

Ground 1 relies on Chae and Narendra in the obviousness combination, with Hong and Android merely providing background knowledge of a POSITA. In the alternative, claims 1, 2, 6, 9, 10, 14, 17, and 22 would have been obvious in view of Chae and Narendra, and further in view of Hong and/or Android. EX1003 ¶¶153-157.

1. Ground 4.1

Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae, Narendra, and Hong. Chae and Narendra disclose user-interface screens with multiple "widgets." *See supra* V.A.1.g. If such disclosure does not alone meet the "widget screen user interface" limitation of claim 1, it would have been obvious to modify Chae and Narendra to implement the specific widgets disclosed by Hong, such as "a clock, a calendar, a memo, search, a map, news," etc. *See* EX1010 ¶¶4-5, Fig. 7A. Chae's and Narendra's general disclosure of screens with multiple widgets would have motivated a POSITA to search within the prior art for known details for implementing widgets and the POSITA would have easily located Hong and its detailed disclosure of widgets. EX1003 ¶154.

2. Ground 4.2

Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae, Narendra, and Android. Chae discloses waking up a smartphone from a power-saving state, as recited by limitation 1g. *See supra* V.A.1.c. If such disclosure is deemed insufficient, it would have been obvious to modify Chae to implement the detailed wake-up process disclosed by Android. *See* EX1007 at 0:24-0:28; *see also id.* at 0:40, 1:07, 2:30, 2:59, 3:20, 3:46. Chae's general disclosure of waking up a smartphone would have motivated a POSITA to search within the prior art for known wake-up processes for smartphones and the POSITA would have easily located Android and its detailed disclosure of a wake-up process. EX1003 ¶155.

Chae and Narendra also disclose user-interface screens with multiple "widgets." *See supra* V.A.1.g. If such disclosure does not alone meet the "widget screen user interface" limitation of claim 1, it would have been obvious to modify Chae and Narendra to implement the specific widgets disclosed by Android, such as the calendar and email widgets. *See* EX1007 at 1:11, 2:06. Chae's and Narendra's general disclosure of screens with multiple widgets would have motivated a POSITA to search within the prior art for known details for implementing widgets and the POSITA would have easily located Android and its detailed disclosure of widgets. EX1003 ¶156.

3. Ground 4.3

Claims 1, 2, 6, 9, 10, 14, 17, 18, and 22 would have been obvious in view of Chae, Narendra, Hong, and Android. A POSITA would have been motivated to combine both Hong and Android with Chae and Narendra in the manner and for the reasons set forth above with respect to Grounds 4.1 and 4.2. *See supra* V.C.1-V.C.2. EX1003 ¶157.

E. Ground 5: Claims 3-5, 11-13, and 19-22 would have been obvious in view of Chae, Narendra, and Shuttleworth and further in view of Hong and/or Android.

Ground 2 relies on Chae, Narendra, and Shuttleworth in the obviousness combination, with Hong and Android merely providing background knowledge of a POSITA. In the alternative, claims 3-5, 11-13, and 19-22 would have been obvious in view of Chae, Narendra, and Shuttleworth and further in view of Hong and/or Android. If Chae's and Narendra's disclosure of (1) waking up a smartphone from a power-saving state, as recited by limitation 1g and (2) the "widget screen user interface" limitation of claim 1 are deemed insufficient, it would have been obvious to modify Chae and Narendra to meet these limitations in the same manner and for the same reasons set forth above in Ground 4. *See supra* V.D. EX1003 ¶¶158-162.

F. Ground 6: Claims 7, 8, 15, 16, 23, and 24 would have been obvious in view of Chae, Narendra, and Karunamuni and further in view of Hong and/or Android.

Ground 3 relies on Chae, Narendra, and Karunamuni in the obviousness combination, with Hong and Android merely providing background knowledge of a POSITA. In the alternative, claims 7, 8, 15, 16, 23, and 24 would have been obvious in view of Chae, Narendra, and Karunamuni and further in view of Hong and/or Android. If Chae's and Narendra's disclosure of (1) waking up a smartphone from a power-saving state, as recited by limitation 1g and (2) the "widget screen user interface" limitation of claim 1 are deemed insufficient, it would have been obvious to modify Chae and Narendra to meet these limitations in the same manner and for the same reasons set forth above in Ground 4. *See supra* V.D. EX1003 ¶¶163-167.

VI. SECONDARY CONSIDERATIONS

Known secondary considerations should be considered but do not control an obviousness conclusion, particularly where, as here, a strong *prima facie* showing of obviousness exists. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). Petitioner is unaware of evidence of secondary considerations, and any such evidence could not outweigh the strong *prima facie* case of obviousness. Petitioner reserves the right to respond to any evidence of secondary considerations.

VII. DISCRETIONARY FACTORS FAVOR INSTITUTION

With respect to 35 U.S.C. § 314(a), *Fintiv* factors 2, 3, 4, and 6 strongly favor institution of this IPR, and factors 1 and 5 are neutral. With respect to factor 2, the final written decision in this IPR is expected long before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation less than five months ago, on October 20, 2022, and the most recent published statistics indicate that the median time to trial for a civil action in the District of Delaware is almost three years. EX1033.

For factor 3, the parties and the court have made little investment in the Delaware Litigation. No discovery or infringement or invalidity contentions have been exchanged and claim construction briefing has not started.

For factor 4, Petitioner stipulates that, if the Board institutes this IPR, Petitioner will not pursue, in the Delaware Litigation, the specific invalidity grounds for the challenged claims raised in this Petition or that reasonably could have been raised in this Petition. This stipulation "mitigates any concerns of duplicative efforts between the district court and the Board," and, thus, factor 4 "weighs strongly in favor of not exercising discretion to deny institution." *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A).

For factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. For factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of this IPR. For factor 5, Petitioner Masimo is a defendant in the Delaware Litigation. In view of all circumstances, the judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

With respect to 35 U.S.C. § 325(d), this Petition presents the first *inter partes* challenge to the ’352 patent and none of the references the Petition relies on were considered during examination. Further, the references presented herein are materially better than the references considered during examination because, as shown above, they disclose every limitation of the independent claims, including the use of different directional swipe gestures to navigate to a home screen or a widget screen from a wake screen. By contrast, the Examiner found that the references considered during examination did not disclose all limitations of the independent claims. Therefore, this Petition presents new prior art and new patentability arguments that have never previously been before the Office.

VIII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1-24 of the '352 patent because they would have been obvious in view of the prior art referenced above. EX1003 ¶162.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 3, 2023

By: /Ted M. Cannon/
Ted M. Cannon (Reg. No. 55,036)
Customer No. 64,735

Attorney for Petitioner
Masimo Corporation

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,106,352**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 13,992 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a).

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 3, 2023

By: /Ted M. Cannon/
Ted M. Cannon (Reg. No. 55,036)
Customer No. 64,735

Attorney for Petitioner
Masimo Corporation

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,106,352** and **EXHIBITS 1001-1019, 1021-1022, 1031-1033, and 1041** are being served on March 3, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 11,106,352 as addressed below:

61725 - Morgan, Lewis & Bockius LLP (PA)(Apple)
1400 Page Mill Road
Palo Alto, CA 94304

Dated: March 3, 2023

By: /Ted M. Cannon/
Ted M. Cannon (Reg. No. 55,036)
Customer No. 64,735

Attorney for Petitioner
Masimo Corporation

56771816

EXHIBIT 17

Filed on behalf of: **Masimo Corporation**
By: Philip M. Nelson (Reg. No. 62,676)
Jarom D. Kesler (Reg. No. 57,046)
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner

v.

APPLE, INC.,
Patent Owner

Case No. 2023-00734
Patent No. 10,942,491

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,942,491

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TABLE OF AUTHORITIES

Page No(s).

TABLE OF AUTHORITIES
(*cont'd*)

Page No(s).

OTHER AUTHORITIES

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,942,491 ('491 Patent)
1002	File History of the '491 Patent
1003	Declaration of Professor R. James Duckworth, Ph.D.
1004	*Curriculum Vitae* of Professor R. James Duckworth, Ph.D.
1005	PCT Publication No. WO 2005/092182 ("Kotanagi")
1006	U.S. Patent No. 6,265,789 to Honda ("Honda")
1007	U.S. Publication No. 2001/0056243 ("Ohsaki")
1008	PCT Publication No. WO 2012/140559 Al ("Shmueli")
1009	European Patent App. No. EP14163114 ("Coppola")
1010	U.S. Provisional Patent App. No. 61/976,388 ("Fei")
1011	PCT Publication No. WO 2015/034149 Al ("Choi PCT")
1012	U.S. Patent Pub. No. 20150214749 A1 ("Park")
1013	Reserved
1014	US 20120221254 A1 (Kateraas)
1015	U.S. Provisional Patent Application No. 61/932258 ("Park Provisional")
1016	US20140135594 ("Yuen")
1017	U.S. Patent No. 10,090,712 ("Jabori")
1018–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola PCT")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")
1023	Korean Patent Application No: 10-2013-0107833 ("Choi")

Exhibit No.	Description
1024	Reserved
1025	U.S. Patent No. 4,163,447 ("Orr")
1026	U.S. Patent No. 4,224,948 ("Cramer")
1027	U.S. Patent No. 4,248,244 ("Charnitski")
1028	PCT Publication No. WO 1982000088 A1 ("Steuer")
1029	U.S. Patent No. 4,375,219 ("Schmid")
1030	U.S. Patent No. 5,316,008 ("Suga")
1031	U.S. Patent No. 5,738,104 ("Lo")
1032	Reserved
1033	US 20050116820 A1 ("Goldreich")
1034	US 20070276270 A1 ("Tran")
1035	US 20080208009 A1 ("Shklarski")
1036	U.S. Patent No. 6,091,530 ("Duckworth")
1037	U.S. Patent 6,075,755 ("Zarchan")
1038	Y. Mendelson, "A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring," Proceedings of the 28th IEEE (2006)
1039	Y. Mendelson, "Wearable Wireless Pulse Oximetry for Physiological Monitoring," PPL Workshop (2008)
1040	Reserved
1041	US 20150355604 A1 ("Fraser")
1042–1046	Reserved
1047	USPTO Memo of April 5, 2018 regarding *Dynamic Drinkware* and *Amgen* cases
1048	District of Delaware Statistics, downloaded on February 21, 2023 from

Exhibit No.	Description
	https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0930.2022.pdf

CLAIM LISTING

Limitation	Claim Language
1a	An electronic watch comprising:
1b	a housing formed from a metal material and defining a rear opening along a rear portion of the housing;
1c	a touch-sensitive display positioned at least partially within the housing;
1d	a band coupled to the housing and configured to couple the electronic watch to a user;
1e	a cover formed from a dielectric material and forming a seal along the rear opening of the housing;
1f	an optical sensor positioned within the housing and configured to transmit an optical signal through the dielectric material of the cover;
1g	a charging coil positioned within the housing and configured to receive wireless power through the dielectric material of the cover;
1h	a first electrode positioned along a rear surface of the electronic watch; and a second electrode positioned along the rear surface of the electronic watch, wherein:
1i	the electronic watch is configured to measure a heart rate using the optical sensor, and
1j	the electronic watch is configured to measure an electrocardiogram using the first electrode and the second electrode.
2	The electronic watch of claim 1, wherein: the cover defines at least one window for the optical sensor; and the cover protrudes outward from a rear housing surface of the housing.

Limitation	Claim Language
3	The electronic watch of claim 1, wherein: the cover is formed from a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material.
4	The electronic watch of claim 1, wherein: the electronic watch further comprises a first magnet positioned within the housing; the first magnet is configured to couple to a second magnet positioned within a charging dock; and the first and second magnets are configured to maintain alignment of the electronic watch with respect to the charging dock.
5	The electronic watch of claim 1, wherein: the electronic watch further comprises a near-field communication system; and the near-field communication system is configured to transmit signals through one or more of the housing or the cover.
6a	The electronic watch of claim 1, wherein: the cover defines a convex exterior profile; and
6b	the convex exterior profile facilitates alignment between the cover and a mating surface of an external wireless charging device.
7a	A wearable electronic device comprising:
7b	a housing formed from a conductive material and defining a first opening opposite to a second opening;
7c	a band attached to the housing and configured to secure the wearable electronic device to a user;
7d	a display positioned in the first opening;
7e	a cover comprising a non-conductive material and positioned over the second opening, the cover forming a portion of an exterior surface of the wearable electronic device;

Limitation	Claim Language
7f	a biosensor module positioned below the cover configured to pass an optical signal through a window defined within the non-conductive material of the cover; and
7g	a wireless charging receive coil aligned with the second opening and below the cover, the wireless charging receive coil configured to inductively couple to an external wireless charging device through the non-conductive material of the cover.
8	The wearable electronic device of claim 7, wherein: the window is a first window; the cover defines a second window; and the biosensor module comprises: a light source configured to emit light toward a region of skin of the user through the first window: and a detector configured to receive light reflected from the region of the skin through the second window.
9	The wearable electronic device of claim 7, wherein: the biosensor module comprises: at least one light source; and a set of detectors; and the at least one light source and the set of detectors are configured to operate as a photoplethysmogram (PPG) sensor.
10	The wearable electronic device of claim 7, wherein: the cover protrudes outward from a rear surface of the housing; the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of the external wireless charging device.
11	The wearable electronic device of claim 10, wherein: the cover forms a waterproof seal with the housing along a perimeter of the cover.

Limitation	Claim Language
12	The wearable electronic device of claim 7, wherein: the wearable electronic device further comprises a first magnet positioned within the housing and below the cover; the external wireless charging device comprises a second magnet; and the first and second magnets are configured to maintain alignment between the wearable electronic device and the external wireless charging device during a charging operation.
13	The wearable electronic device of claim 7, wherein: the wearable electronic device further comprises: a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode positioned along the rear surface of the wearable electronic device; and the wearable electronic device is configured to measure an electrocardiographic characteristic using the first and second electrodes.
14a	An electronic device, comprising: a housing defining a first opening and a second opening;
14b	a display positioned at least partially within the first opening;
14c	a biosensor module aligned with the second opening;
14d	a wireless charging receive coil positioned within the housing and aligned with the second opening;
14e	a battery operably coupled to the wireless charging receive coil; and
14f	a cover formed from an optically transparent material and disposed over the biosensor module and the wireless charging receive coil, wherein:
14g	the electronic device is configured to receive wireless power through the optically transparent material of the cover using the wireless charging receive coil; and

Limitation	Claim Language
14h	the electronic device is configured to measure a heart rate of a user through the optically transparent material of the cover using the biosensor module.
15	The electronic device of claim 14, wherein: the biosensor module includes an array of optical components; and the cover defines an array of windows, each window of the array of windows aligned with a respective optical component of the array of optical components.
16a	The electronic device of claim 14, wherein: the biosensor module comprises: a light source; and a detector;
16b	the light source and the detector are configured to measure changes in light absorption by a region of skin of the user;
16c	the electronic device is configured to compute the heart rate using the measured changes in light absorption; and
16d	the display is configured to display information associated with the heart rate.
17	17. The electronic device of claim 14, wherein: the electronic device further comprises: a first electrode disposed along an exterior of the electronic device; and a second electrode disposed along the exterior of the electronic device; and the first and second electrodes are configured to measure an electrocardiographic characteristic of the user.
18	The electronic device of claim 14, wherein: the electronic device further comprises a magnet that is configured to magnetically couple the electronic device to an external inductive power transmitter dock through the cover.

Limitation	Claim Language
19	The electronic device of claim 14, wherein the cover protrudes outward from a rear surface of the housing to facilitate alignment between the cover and a mating surface of an external wireless charging device.

Grounds Listing

GROUND 1	Claims 7, 11, 14, and 16 are unpatentable as obvious in view of Kotanagi and Honda
GROUND 2	Claims 1–3, 5, 13, and 17 are unpatentable as obvious in view of Kotanagi, Honda, and Choi
GROUND 3	Claims 8 and 15 are unpatentable as obvious in view of Kotanagi, Honda, and Fraser
GROUND 4	Claim 9 is unpatentable as obvious in view of Kotanagi, Honda, and Orr
GROUND 5	Claims 12 and 18 are unpatentable as obvious in view of Kotanagi, Honda, and Park
GROUND 6	Claim 4 is unpatentable as obvious in view of Kotanagi, Honda, Choi, and Park
GROUND 7	Claims 10 and 19 are unpatentable as obvious in view of Kotanagi, Honda, and Jabori
GROUND 8	Claim 6 is unpatentable as obvious in view of Kotanagi, Honda, Choi, and Jabori

Masimo Corporation ("Petitioner" or "Masimo") requests *inter partes* review of Claims 1–19 of U.S. Patent No. 10,942,491 ("the '491 Patent").

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is the real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the '491 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN ("the Delaware Litigation").

3. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	**Back-up Counsel**
Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson, & Bear, LLP 2pmn@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Jarom D. Kesler (Reg. No. 57,046) Knobbe, Martens, Olson, & Bear, LLP 2jzk@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson, & Bear, LLP 2tmc@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 64,735 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to Masimo-491@knobbe.com.

B. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

C. Grounds for Standing (37 C.F.R. § 42.104(A))

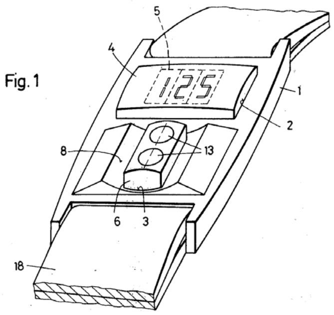
Petitioner hereby certifies that the ’491 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

Wearable electronic devices have taken the form of smart watches for decades, and these have long included health monitoring features. When Apple revealed its first smart watches in 2015, the company joined a long tradition. The chart[1] below shows some biosensor smartwatch patent figures through the decades:

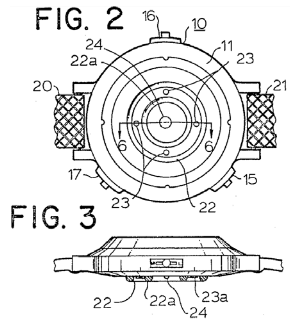
[1] These references are discussed further in EX1003 ¶¶61–106.

1978



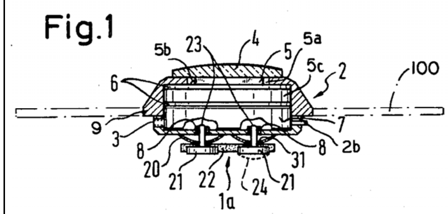
EX1022

1980



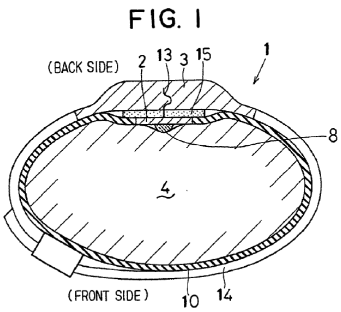
EX1026

1983



EX1029

2001



EX1007

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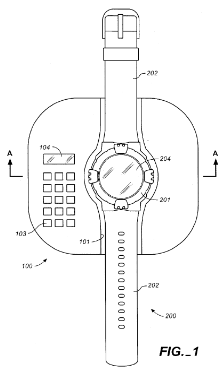
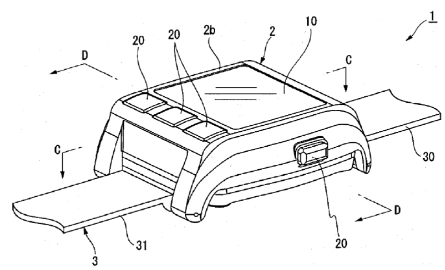


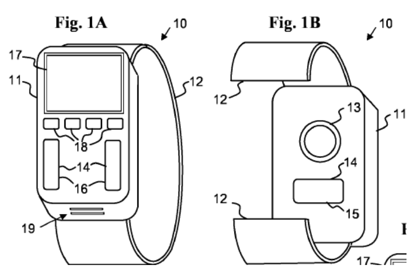
EX1006

2005



EX1005

2012



EX1008

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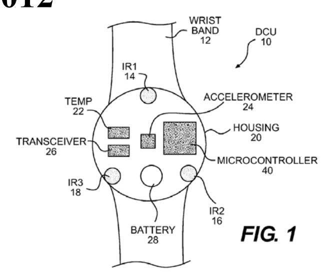
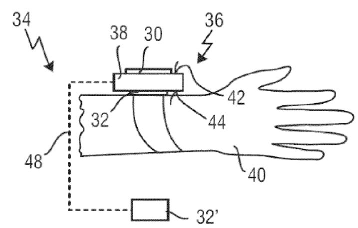


EX1014

2014



EX1020

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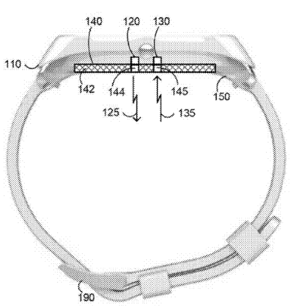
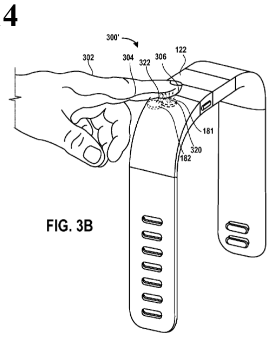


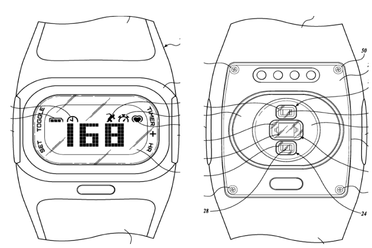
EX1041

2014



EX1016

2014



EX1010

Not all of these references are used as a substantive basis for this petition. However, the figures above (and the overview of developments in earlier decades, EX1003 ¶¶61–106, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art ("POSITA") at the time of invention. Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶ 1–326.[2]

B. Overview of the '491 Patent

Apple's '491 patent alleges improvements to health-monitoring smart watches, but the challenged claims (Claims 1–19 of the '491 Patent) merely recite features that were well known prior to that Patent, and their combinations in the claims provided no unexpected results or benefits. The following compares '491 patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

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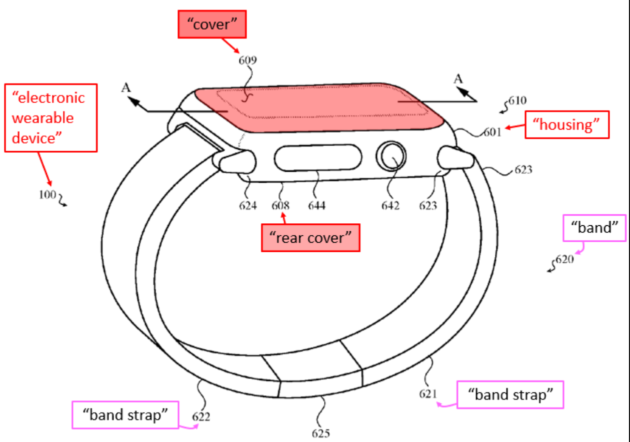
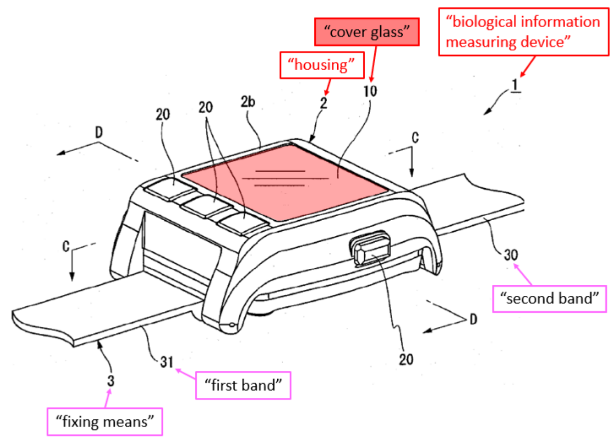
[2] In general, a single citation to Dr. Duckworth's expert declaration is provided at the end of each paragraph that is supported by Dr. Duckworth's testimony. However, additional citations may also be included.

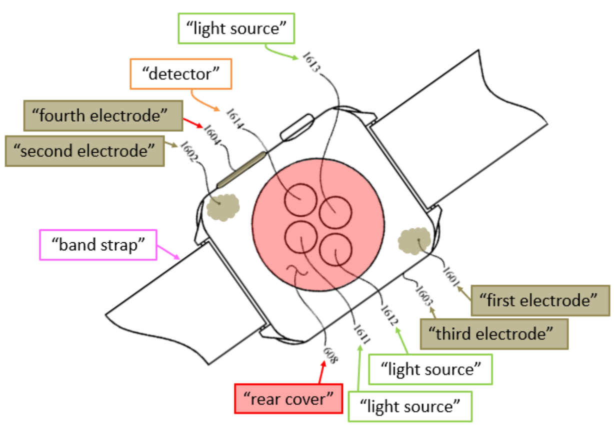
’491 Patent



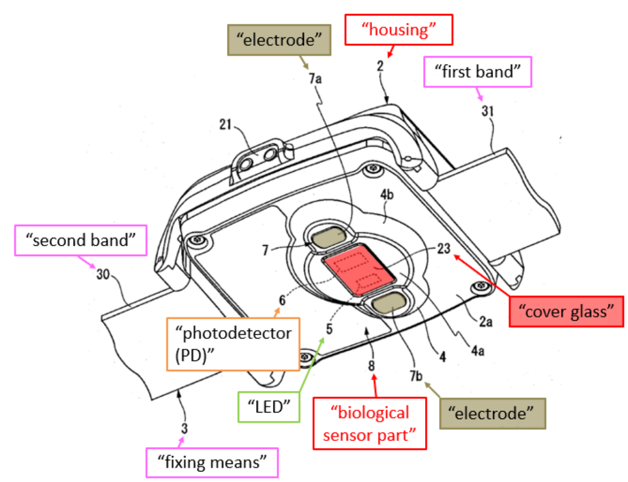
Prior Art – Kotanagi



’491 Patent



Prior Art - Kotanagi



See[3] EX1001 at 12, 22 (Figs. 6 and 16); *see* EX1005 at 25–26 (Figs. 4 and 5).

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[3] In this petition, color feature labels and color shadings are added for convenience and do not come from the cited patent drawings themselves.

C. Prosecution History

The Examiner rejected Claims 21–40 in a Non-Final Rejection on May 13, 2020. EX1002 at 1119–1131. Applicant thereafter amended the independent claims on August 13, 2020 to recite that wireless power is sent "through" a sensor cover that is "dielectric" (Claim 21, issued Claim 1), "non-conductive" (Claim 28, issued Claim 7), and "optically transparent" (Claim 35, issued Claim 14). *Id*. at 595–599. Applicant emphasized these amendments in an interview, then summarized as follows: "the cited references do not disclose or suggest an electronic watch that includes an optical sensor and a charging coil that are configured to pass both optical signals and wireless power signals through dielectric material of a single cover." *Id*. at 601–603. A similar summary was provided for independent claims 28 (issued Claim 7) and 35 (issued claim 14), but substituting the words "non-conductive" and "transparent" for "dielectric." *Id*. In response to these amendments and arguments, the Examiner allowed the claims on November 4, 2020. *Id*. at 468–473.

Importantly, the '491 prosecution history shows Examiner did not consider, and Applicant did not cite, any of the references that that Petitioner relies on in the grounds of this Petition. *See generally* EX1002. These references teach what the Applicant said was missing from the prior art: a watch with an optical sensor and

charging coil, both configured to pass their signals through a single glass cover. *See* EX1005 ¶55; EX1006 15:47–49.

D. Priority

The ’491 patent was filed March 20, 2020, which is a continuation of U.S. Application No. 15/261,912, filed on September 10, 2016, U.S. Application No. 15/261,914, filed on September 10, 2016, U.S. Application No. 15/261,917, filed on September 10, 2016, and U.S. Application No. 14/842,617, filed on September 1, 2015. U.S. Application No. 14/842,617 claims priority to provisional application 62/044,974, filed on September 2, 2014— the earliest alleged priority date of the ’491 Patent. EX1001 at 1; EX1002 at 1478–1479.

E. Level of Ordinary Skill in the Art

A POSITA of the ’491 patent would have had at least a bachelor’s degree in a discipline related to biomechanical devices, such as Mechanical Engineering, Biomedical Engineering, Electrical Engineering, Physics, Industrial Design, or an equivalent discipline, and at least three years of experience working with or developing electronic medical or consumer devices.

F. Claim Construction

Numerous claim terms are construed based on their ordinary meanings or otherwise in the context of the invalidity analysis in this petition, consistent with

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005).[4] Constructions of a few example terms and phrases are also discussed here for convenience.

1. <u>"non-conductive cover material"</u>

Claim 1 recites "a cover formed from a dielectric material." EX1001 58:5. Claim 3 further specifies that the cover is formed from "a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material." *Id*. 58:28–30. EX1003 ¶45. Claim 7 recites "a cover comprising a non-conductive material." EX1001 58:56. The prior art references used in this petition confirm that glass is electrically non-conductive. *See* EX1006 15:62 ("insulating body (glass, for example)"); *Id*. 16:14–15 ("glasses 211 and 111 may be replaced with other insulating materials"). Accordingly a POSITA would have understood that glass and sapphire are electrically non-conductive, dielectric and optically transparent materials. EX1003 ¶46.

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[4] Any positions asserted in this petition regarding the scope of the claims should not be taken as assertions regarding the appropriate claim scope in other adjudicative forums where a different standard of claim construction and/or claim interpretation may apply, or where the claim language or context differs.

2. <u>“defines at least one window” and “window defined”</u>

Claims 2, 7, and 8 recite that a window is “defined” in the cover. The ’491 patent does not provide an explanation of what a “window” is, although the ’491 patent often recites “windows or apertures.” EX1001 28:38–29.[5] The ’491 patent describes the windows as follows:

> The device 100 may also include a **rear cover 608** located on the rear-facing surface of the housing 601 of the device body 610. . . . [T]he rear cover 608 may be formed from a sapphire sheet, zirconia, or alumina material . . . . [T]he biosensors are **disposed relative to or attached to a rear cover 608** that is formed from an optically transparent material and is configured to be **positioned with the opening of the housing** 601. . . . The convex curved area of the rear cover 608 may include one or more windows or apertures that provide operational access to one or more internal components located within the housing. For example, the rear cover 608 may include an array of windows, each window including an aperture or opening for a respective light source 1611–1613 and/or the detector 1614.

EX1001 26:12–19 (emphasis added). *Id.* 40:46–67. EX1003 ¶¶47–48.

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[5] Citations containing a colon (“:”) are to columns and lines, where available, or to pages and lines, where lines are numbered. Citations to documents having square brackets “[]” for paragraph numbering use brackets instead of paragraph symbols “¶”.

Accordingly, the ’491 patent describes a single sheet of material positioned within a single opening in a housing. This sheet defines one or more windows or apertures, where sensors are positioned immediately behind that sheet. *Id*. 40:46–67.

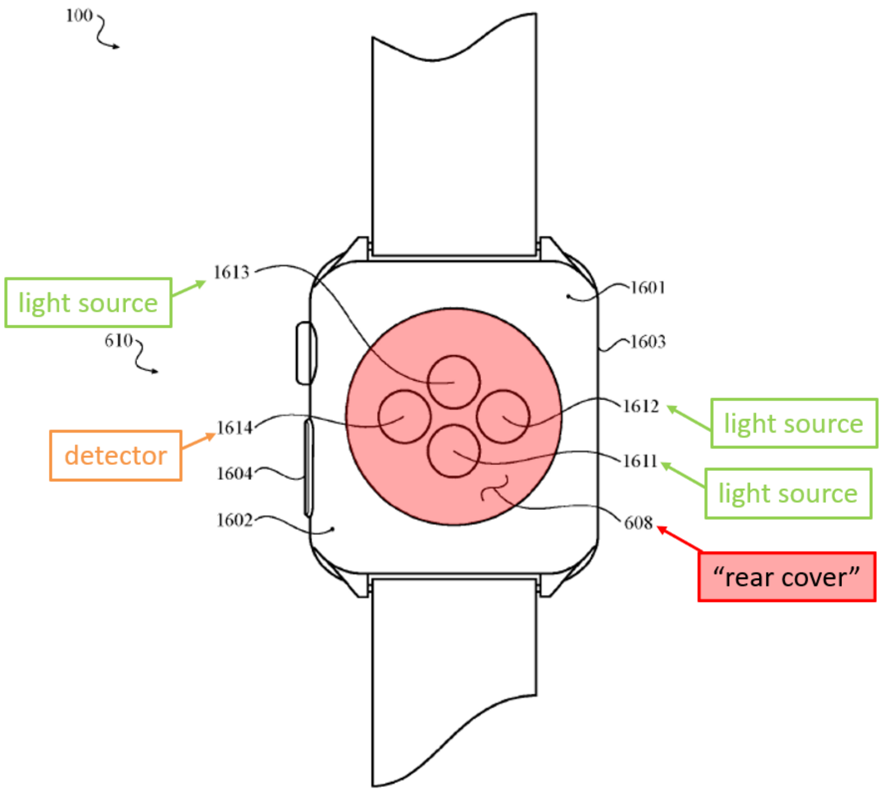

FIG. 16

See EX1001 at 22. Thus, to “define” an opening simply means to allow passage of light to a relevant component through an opening. In the ’491 patent, the single rear cover 608 “defines” multiple openings by allowing passage of light through the round portions labeled 1611–1614 in Fig. 16. EX1003 ¶¶47–48.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Petitioner requests that the Board cancel claims 1–19 of the '491 patent under post-AIA 35 U.S.C. § 103 because they would have been obvious to a POSITA before their effective filing date.

B. Status of References as Prior Art

The following references are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'491 patent (background section)	Admitted Prior Art
1005	Kotanagi	Post-AIA 35 U.S.C. §102(a)(1) – published October 6, 2005
1006	Honda	Post-AIA 35 U.S.C. §102(a)(1) – issued July 24, 2001
1011	Choi	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed September 9, 2013 (see EX1023)
1012	Park	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed February 22, 2014 (see EX1015)
1017	Jabori	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed January 30, 2014
1025	Orr	Post-AIA 35 U.S.C. §102(a)(1) – published August 7, 1979
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed June 5, 2014

These references constitute analogous art because they are from the same field of endeavor as the '491 patent, e.g. biosensing watches and wireless charging of personal electronic devices. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, e.g., biosensors and wireless charging through the rear cover of biosensing watches. A POSITA is presumed to have been aware of such analogous references. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988). The significantly overlapping features between the references listed above and the '491 patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the figures in *supra* § II(B) show many similarities between the '491 patent and Kotanagi. These and similar figures throughout support the obviousness combinations generally and show these references are analogous. As set forth below, a POSITA would have been motivated to combine these references prior to the filing of the '491 patent for many additional reasons. EX1003 ¶¶107–323.

a. Park 35 U.S.C. § 102(a)(2) Analysis

Park (EX1012) was published July 30, 2015 and is prior art under post-AIA 35 U.S.C. § 102(a)(2) because it claims priority to U.S. provisional 61/932,258 ("Park Provisional" EX1015) filed January 28, 2014, which is before September 2, 2014, the earliest effective filing date of the '491 patent. EX1012 at 1.

The Park Provisional provides the same relevant disclosure as Park, and parallel citations to EX1012 and EX1015 are provided herein. Figure sets in these exhibits are identical. EX1012 at 2–14; EX1015 at 53–65. The Park Provisional provides support[6] for at least Park's Claim 1. *See* EX1012 at 25; paragraph spanning EX1015 at 5–6. Thus, Park is entitled to the provisional's priority date of January 28, 2014. EX1003 ¶¶116–121.

b. <u>Jabori 35 U.S.C. § 102(a)(2) Analysis</u>

Jabori is a PCT publication designating the United States. 35 U.S.C. § 374. Effectively filed January 30, 2014, it predates the earliest priority of the '491 patent and is therefore prior art. 35 U.S.C. § 102(d)(1).

[6] A showing that the Park Provisional supports one of Park's claims is not necessary under USPTO guidance indicating that *Dynamic Drinkware* does not apply to post-AIA cases. *See* EX1047 at 3. Nevertheless, Masimo makes such a showing out of an abundance of caution in view of post-AIA Board cases that apply it. *See, e.g.*, *Mueller Sys., LLC v. Rein Tech, Inc.*, Case No. IPR2020-00100, 2020 WL 2478524, at *10 (PTAB May 12, 2020); *Epizyme, Inc. v. GlaxoSmithKline LLC*, Case No. IPR2020-01577, 2021 WL 841118, at *10–11 (PTAB Mar. 5, 2021).

c. **Choi 35 U.S.C. § 102(a)(2) Analysis**

PCT. Pub. No. WO 2015/034149 ("Choi PCT", EX1011) published March 12, 2015 and is prior art under 35 U.S.C. § 102(a)(2) because it designates[7] the U.S. with an effective filing date before the '491 patent's earliest effective filing date. EX1011 at 1. Choi PCT claims priority to KR10-2013-0107833 ("Choi", EX1023) filed September 9, 2013. EX1011 at 1; EX1023 at 2.

Choi PCT has literal support from the Korean filing of September 9, 2013, and Choi provides support for every limitation relied upon in this petition. Choi PCT's Figures 1–8 are identical to Choi. Compare EX1011 at 24–30 and EX1023 at 28–33. Further, every limitation relied upon in this petition provides pincites to both Choi and Choi PCT. EX1003 at ¶¶123–128.

d. **Fraser 35 U.S.C. § 102(a)(2) Analysis**

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the '491 patent's earliest priority and is therefore prior art. 35 U.S.C. § 102(d)(1).

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[7] *See* 35 U.S.C. § 374 "The publication under the treaty defined in section 351(a), of an international application designating the United States shall be deemed a publication under section 122(b), except as provided in section 154(d)."

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

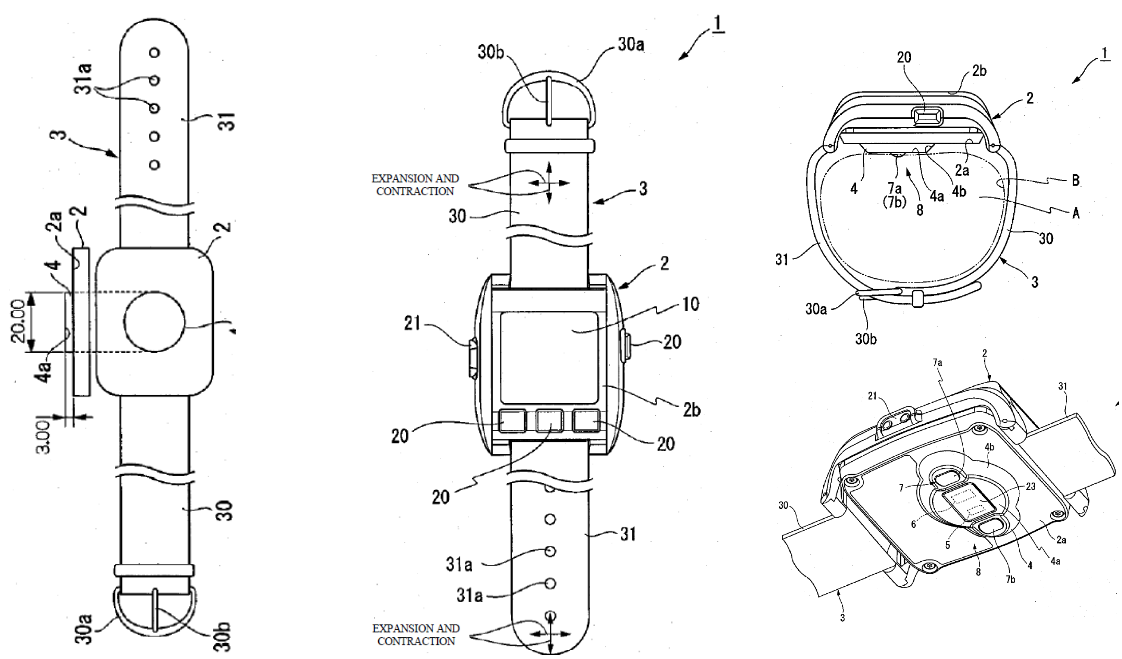
As explained below, claims 1–19 of the '491 patent would have been obvious to a POSITA in view of the prior art at the relevant time. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond,* 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

A. Ground 1: Claims 7, 11, 14, and 16 are unpatentable because they would have been obvious over Kotanagi in view of Honda.

1. Independent Claim 7

a. [7a] "A wearable electronic device comprising:"

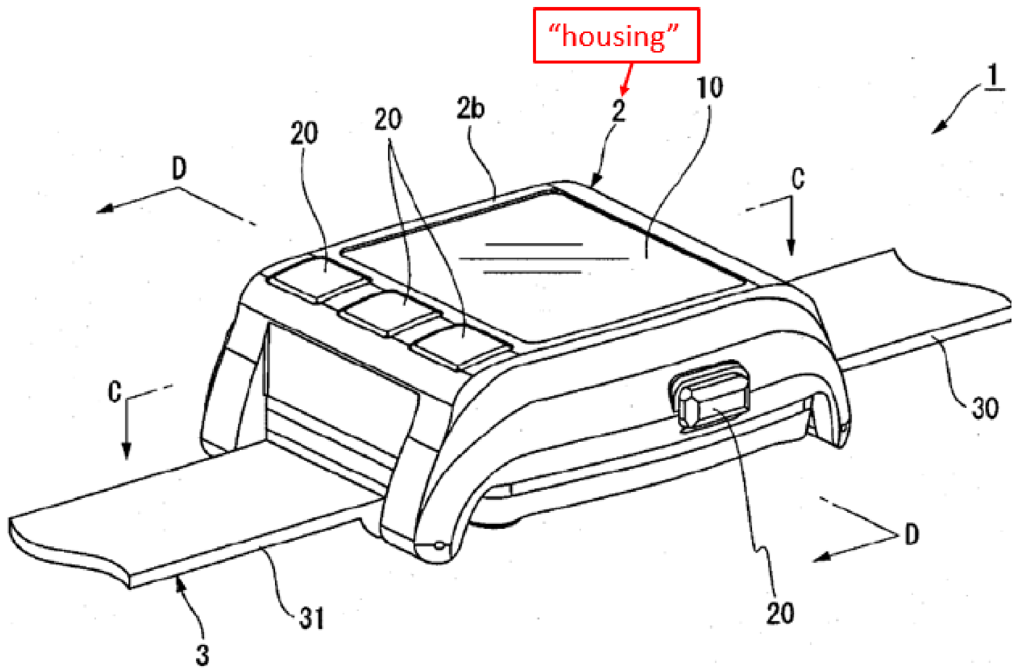
Kotanagi describes a "wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist." EX1005 ¶44.



Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8). EX1003 ¶131.

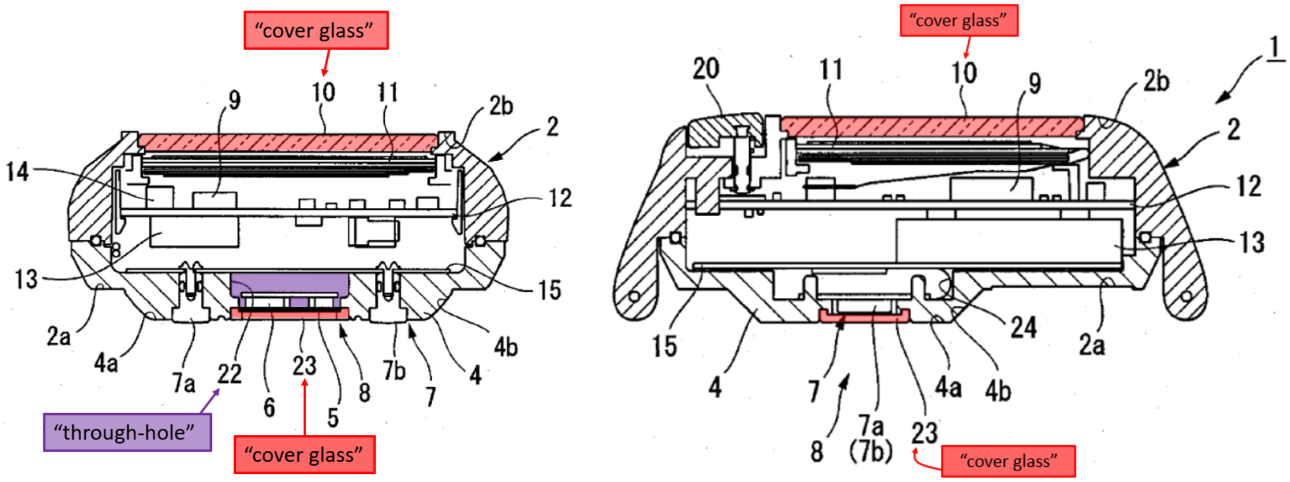
b. [7b] "a housing formed from a conductive material and defining a first opening opposite to a second opening;"

Kotanagi teaches "The housing 2 . . . is made of plastic or a metal material such as aluminum." EX1005 ¶48.



EX1005 at 25 (Fig. 4). A POSITA would have understood that aluminum is strongly conductive (EX1003 ¶133), thus, Kotanagi teaches a conductive housing. Moreover, Honda explicitly describes its metal housing as "conductive." EX1006 13:22–32. EX1003 ¶133.

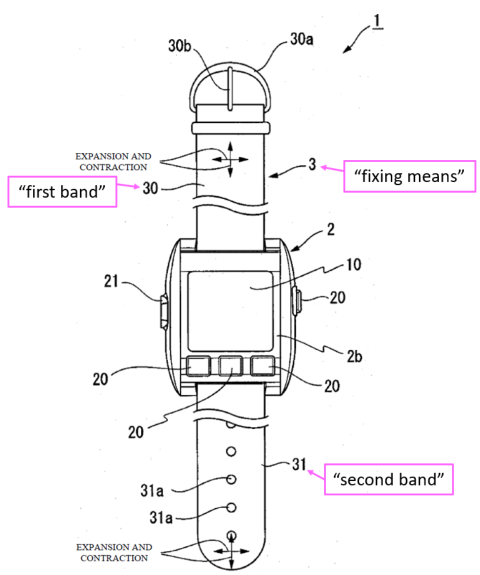
Kotanagi's housing has a "first opening" at the top and a "second opening" ("through-hole 22") at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings, and both have been shaded here:



EX1005 at 27 (Figs. 7, 6). EX1003 ¶134.

c. [7c] "a band attached to the housing and configured to secure the wearable electronic device to a user;"

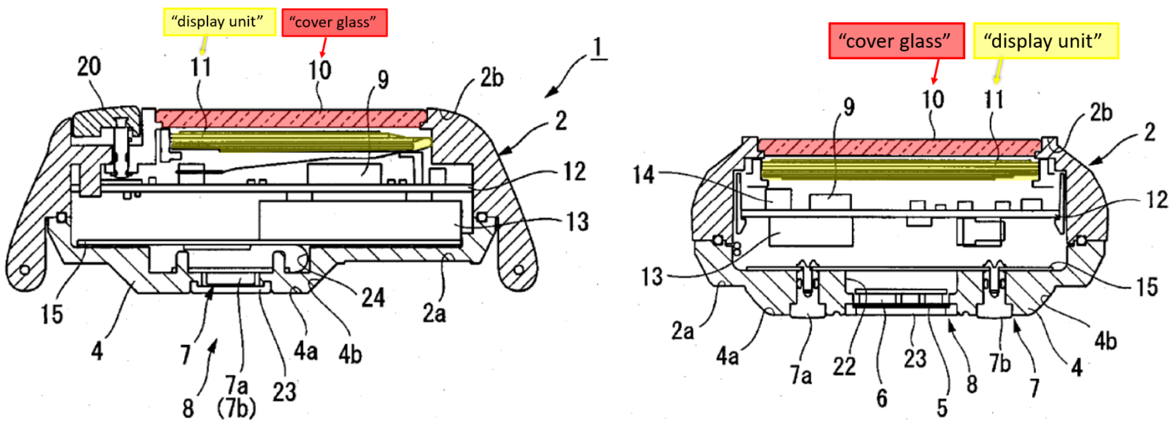
Kotanagi has a "means for fixing" the device "to an arm" (*id*., Abstract) and explains: "The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist." (*id*. ¶60).



See id. at 23 (Fig. 1). EX1003 ¶135.

d. [7d] "a display positioned in the first opening;"

Kotanagi teaches that "a display part 11 for displaying . . . pulse rate . . . and various other information is disposed inside the cover glass 10." EX1005 ¶48.

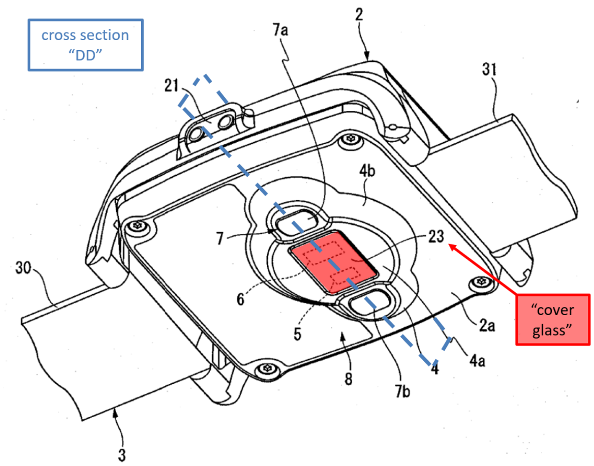


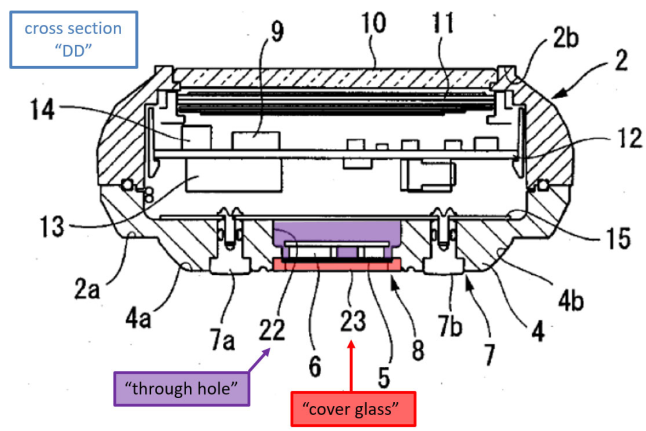
See EX1005 at 27 (Figs. 6, 7). EX1003 ¶136.

e. [7e] "a cover comprising a non-conductive material and positioned over the second opening, the cover forming a portion of an exterior surface of the wearable electronic device"

Kotanagi teaches that "cover glass 23 is fixed to the housing 2 so as to block the through-hole 22." EX1005 ¶55. A POSITA would have known that glass is a non-conductive material.[8] Kotanagi's cover glass is positioned as claimed and forms a portion of the exterior surface, as shown in the figures below:

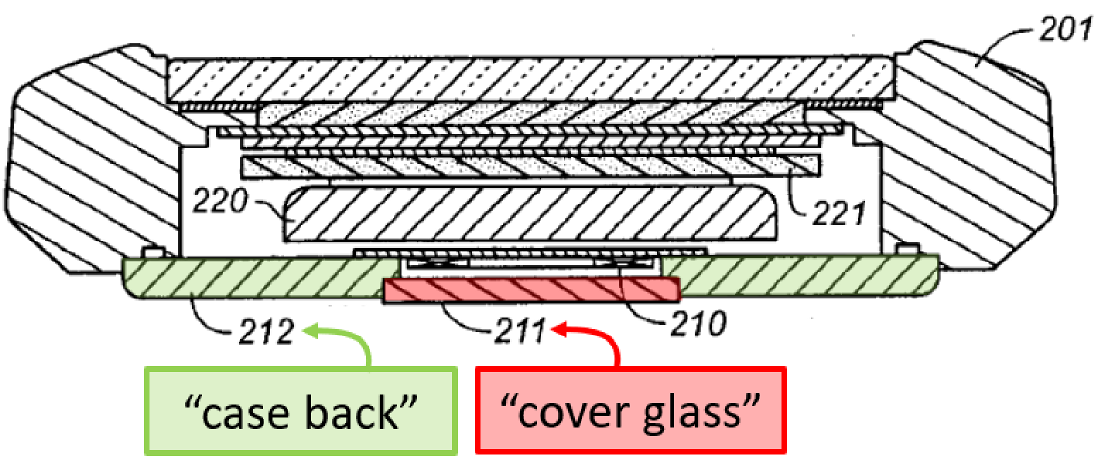
8 Honda teaches this. EX1006 15:62 ("insulating body (glass, for example)"). Dependent Claim 3 states that the "dielectric" cover of Claim 1 is glass or sapphire, confirming that the Applicant considered glass non-conductive.





See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶¶137.

Moreover, **Honda**, which issued in 2001, discloses a biosensing watch with a metal case back and a non-conductive glass cover, as shown in this cross-section:



See EX1006 at 3 (Fig. 2). EX1003 ¶138.

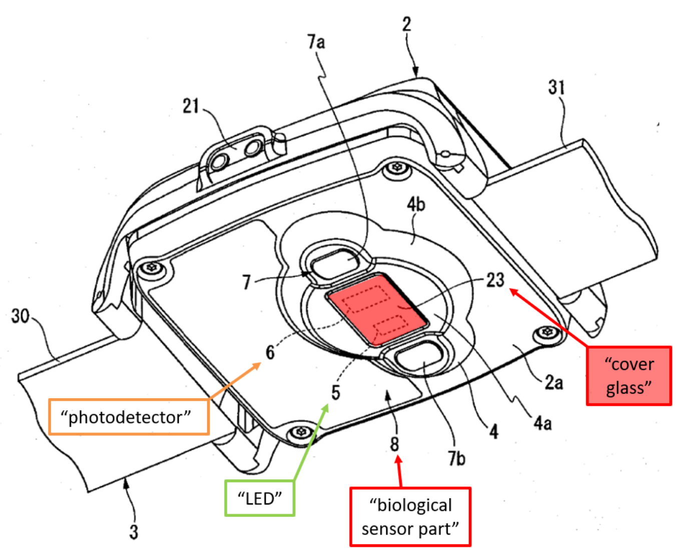
Honda teaches "In the first embodiment, the case back 212 (typically made of a metal) and the cover glass 211 are arranged as shown in FIG. 2." EX1006 15:47–49. Honda additionally teaches that "the cover glasses 211 and 111 may be replaced with other insulating materials." *Id.* 16:14–15. EX1003 ¶139.

f. <u>[7f] "a biosensor module positioned below the cover configured to pass an optical signal through a window defined within the non-conductive material of the cover; and"</u>

Kotanagi teaches the following biosensor module "disposed on the lower surface 4a of the protruding part 4":

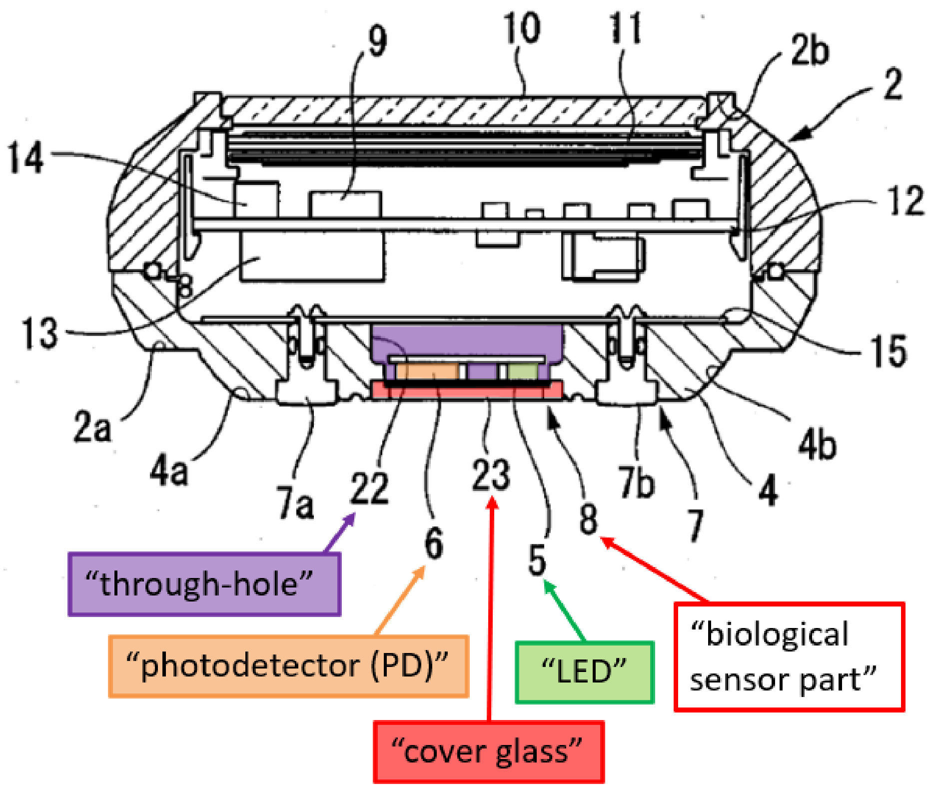
> A biological sensor part 8, which includes an LED (Light Emitting Diode) (light-emitting part) 5 for emitting light toward the living body while in contact with the living body surface B side, a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body out of the light emitted by the LED 5 and generating a pulse signal (biological information signal) corresponding to the amount of received light …

EX1005 ¶46. These features are illustrated below (behind) the cover glass 23, as shown with dashed lines in Kotanagi's Figure 5:



See EX1005 at 26 (Fig. 5). EX1003 ¶140–141.

Kotanagi further explains that its "cover glass 23" covers optical components of its biosensor moldule: "a cover glass 23 is fixed to the housing 2 so as to block the through-hole 22. The LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." *Id.* ¶55.



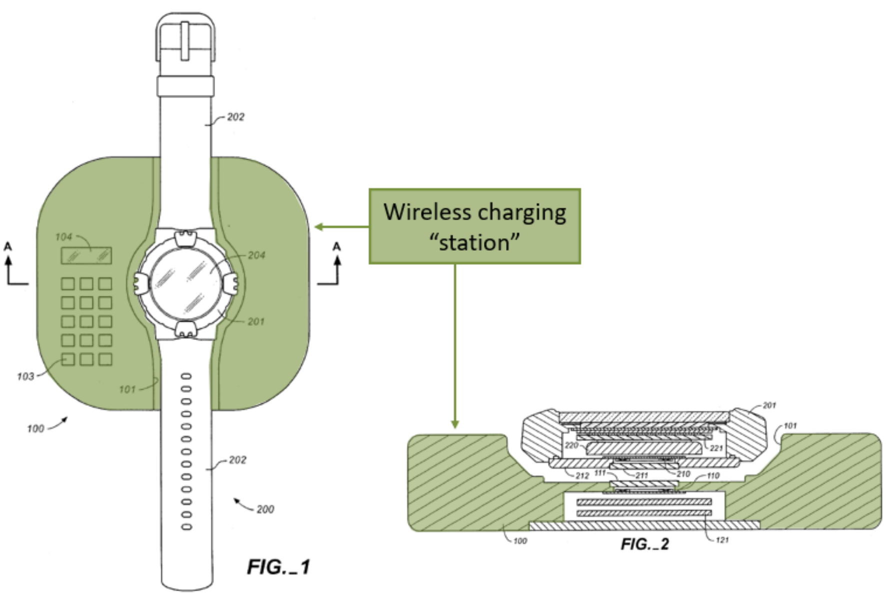
See id. at 27 (Fig. 7). EX1003 ¶142.

A POSITA would have understood from this context that because Kotanagi's "cover glass 23 is fixed to the housing 2 so as to block the through-hole 22" (EX1005 ¶55), its LED and photodetector work by passing optical signals through the cover glass. Thus, Kotanagi's cover glass passes optical signals to and from the LED and photodetector, satisfying this limitation. EX1003 ¶143.

g. **[7g] "a wireless charging receive coil aligned with the second opening and below the cover, the wireless charging receive coil configured to inductively couple to an external wireless charging device through the non-conductive material of the cover."**

Kotanagi teaches that "a transformer or the like for supplying power to a recharger and to the inside of the housing 2 may be provided ***so as to recharge the rechargeable battery 13 in a contactless state***." EX1005 ¶53 (emphasis added). A POSITA would have known at the time of the '491 Patent's disclosure that transformers use coils and that such contactless charging involves a wireless charging receive coil. EX1003 ¶144.

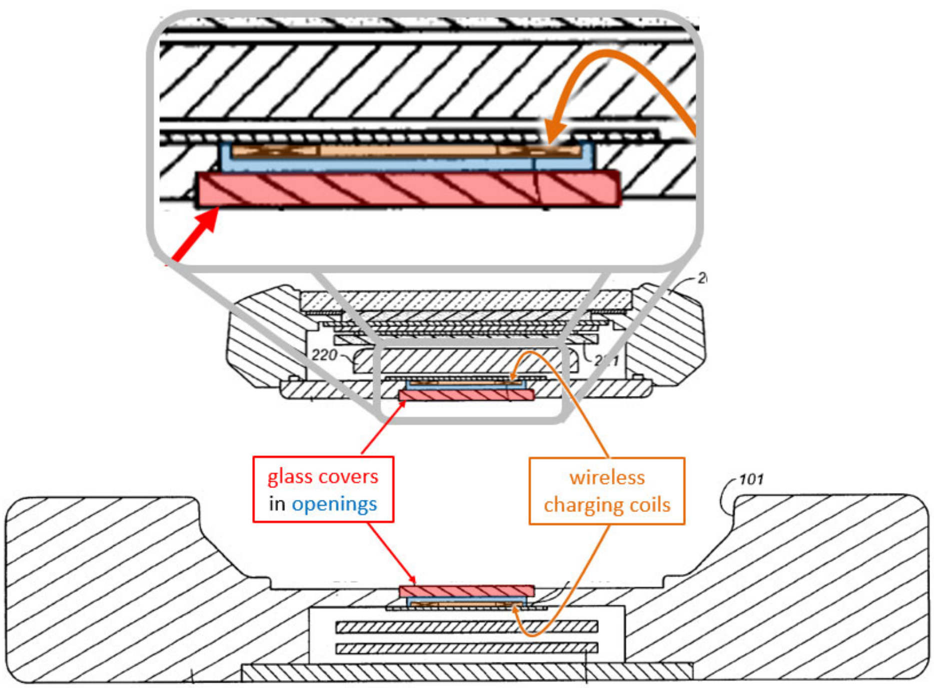
Honda, which issued in 2001, discloses such a contactless charging system for a biosensing wristwatch. Honda's figures show plan and cross-section views:



See EX1006 at 2–3 (Figs. 1, 2). EX1003 ¶145.

Like Kotanagi, Honda teaches a biosensor: "the electronic watch 200 detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–19. Like Kotanagi, the Honda watch has a "cover glass" over an opening in the bottom face of the watch. *Id.* at 6:24–25. These similarities increase a POSITA's expectation of a successful combination. EX1003 ¶146.

Behind Honda's cover glass is a charging coil: "[A] watch-side coil 210 for the data transmission and the battery charging is arranged in a case back 212 of the watch body 201 and is covered with a cover glass 211." *Id*. 6:22–25. Honda thus teaches a "wireless charging receive coil" "aligned with" the opening, and "below the cover," as claimed:



See EX1006 at 3 (Fig. 2). EX1003 ¶147.

Honda further teaches inductive coupling of the charging station coil and the watch coil:

> When the electronic watch 200 is placed onto the station 100, the station-side coil 110 and the watch-side coil 210 are physically out of contact with each other, but magnetically coupled with each other because the surfaces of coil winding of both coils are generally in parallel to each other.

EX1006 6:36–40.

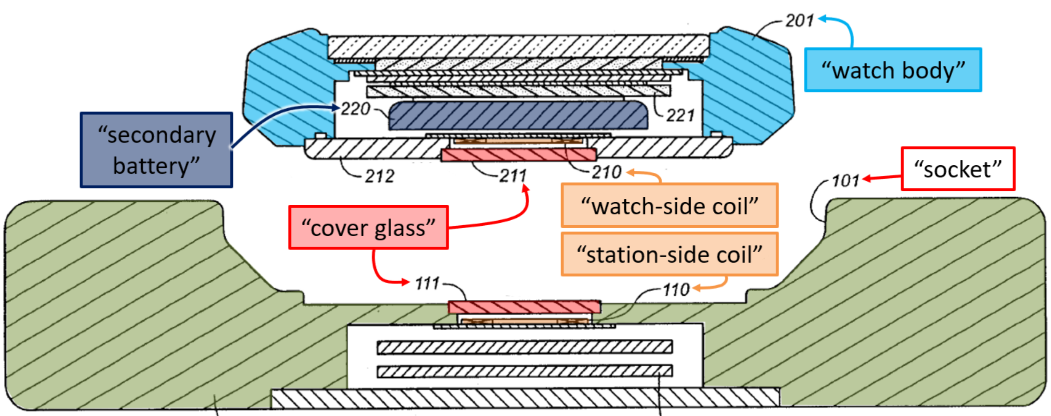
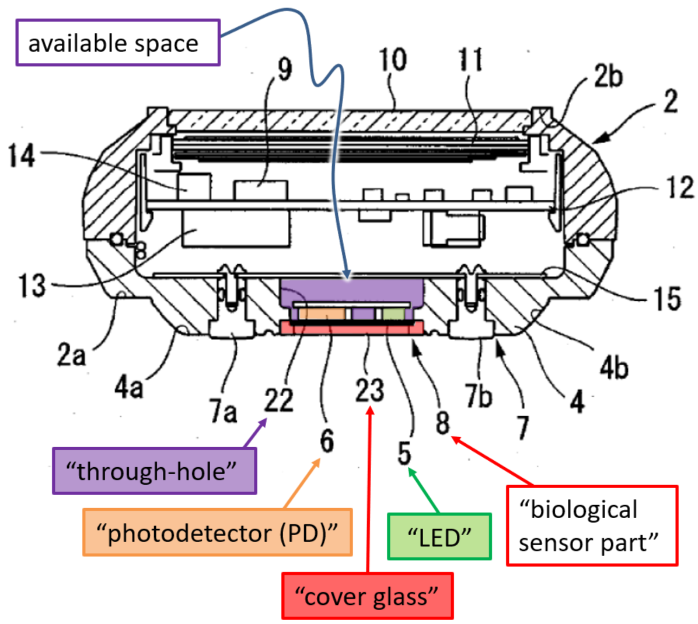


FIG._2

See id. at 3 (Fig. 2). EX1003 ¶148.

Given Honda's teaching of a wireless receive coil near a rear opening similar to that taught in Kotanagi (where both Honda's and Kotanagi's openings have a cover glass), a POSITA would have used Honda's teachings to either: 1) modify Kotanagi to position a wireless charging coil behind Kotanagi's cover glass, LED, and PD; or 2) enlarge Kotanagi's opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD. In either

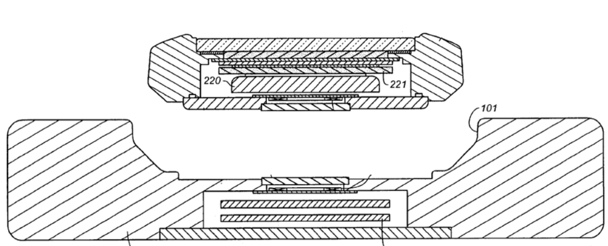
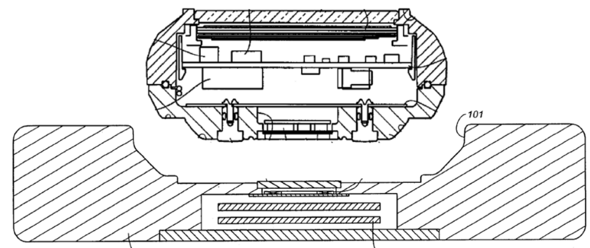
case, the resulting magnetic flux would pass through the cover glass, as taught by Honda. The purple shading in the figure below shows that space was already available in Kotanagi's "through-hole" behind and around the outside of the other listed components, making the modification from Honda simple and feasible, with a high expectation of success:



See EX1005 at 27 (Fig. 7). EX1003 ¶142.

Honda teaches using its wireless receive coil cooperatively with an "external wireless charging device," through a nonconductive cover material, as claimed. A POSITA would have known that Kotanagi's transformer for recharging in a "contactless state" (EX1005 ¶53) involves such a charging device. Consistent with Honda's teaching to align by seating a watch in a station "socket" (EX1006 6:7), a

POSITA would have readily used Honda's charging station (or something similar), with Kotanagi's watch, as shown in the figures below. EX1003 ¶150.

Honda's watch, with Honda's station (*see* EX1006 at 3):	Kotanagi's watch, with Honda's station (*see* EX1006 at 3, EX1005 at 27):
 FIG._2	 FIG._2

After addressing any potential scale differences, a POSITA would have readily combined Kotanagi's watch with Honda's charging station at least because the figures suggest complementary shapes. Thus, Honda and Kotanagi teach that aligning and positioning the coil within Kotanagi's watch as described above also configures the coil "to inductively couple to an external wireless charging device through the non-conductive material of the cover" as claimed. EX1003 ¶151.

Moreover, Honda's Figure 15 and related text (see below) teach metal covers are inferior for power transmission due to, e.g., eddy currents. EX1006 at 14; *id.* at 2:48–50 ("eddy currents take place in the electrically conductive metal material, weakening the electromagnetic coupling"). A POSITA would have known from Honda's disclosure to wirelessly charge through a non-conductive material as "the use of the conductive member is not appropriate for a high-efficiency transmission." EX1006 13:30–32. Honda's experiments show wireless

charging through a glass surface is orders of magnitude more efficient that charging through stainless steel:

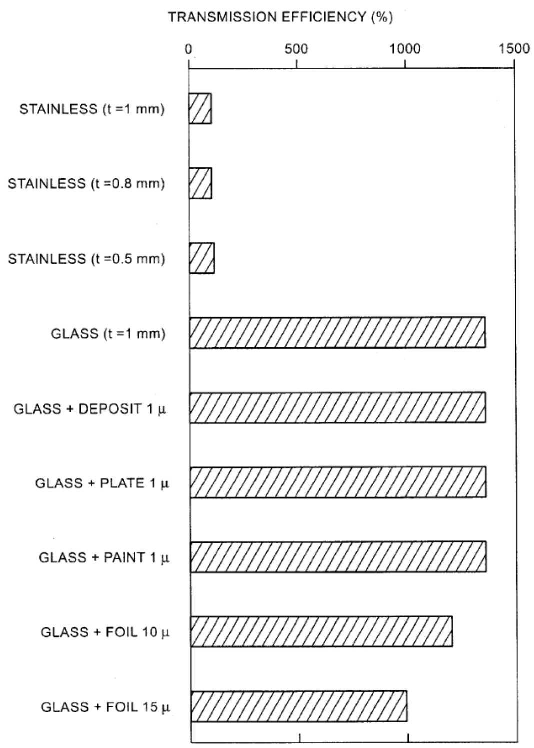


FIG._15

EX1006 at 14. Thus, a POSITA would have aligned Honda's coil with Kotanagi's opening such that inductive coupling occurs "through the non-conductive material of the cover," as claimed. EX1003 ¶155.

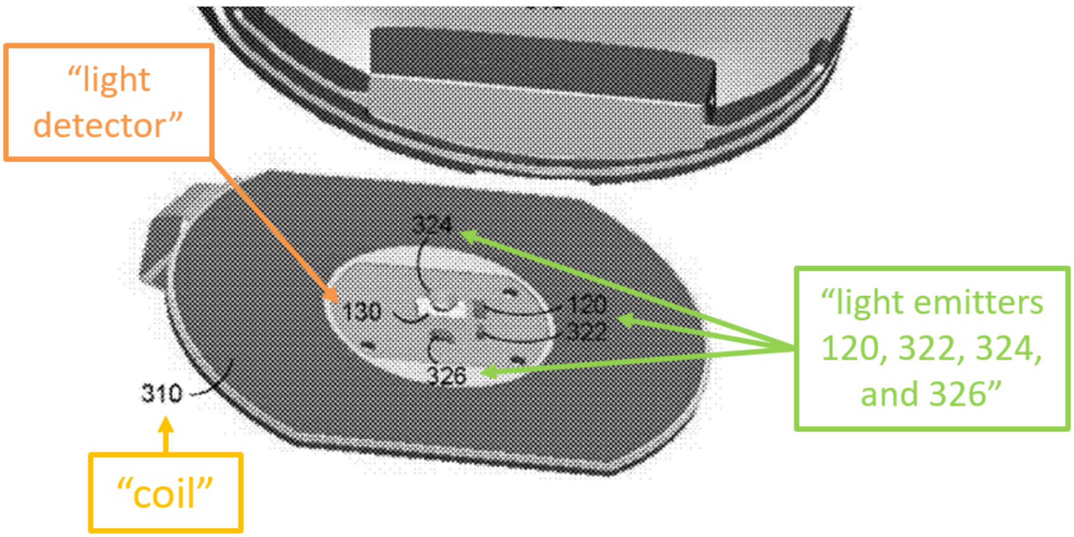
h. Motivation to Combine Kotanagi and Honda

Kotanagi and Honda were both assigned to Seiko companies. *See* EX1005 at 1, EX1006 at 1. Thus, a POSITA having Kotanagi would have also had access to Honda and readily combined teachings from the two references. Prior to September 2014, a POSITA would have been motivated to make the modifications

explained above based on teachings of both Kotanagi and Honda and would have had a reasonable expectation of success in doing so. Kotanagi teaches a pulse rate biosensor watch that may be charged in a "contactless state," (EX1005 ¶53), motivating a POSITA to look to Honda for "familiar elements" that do "no more than yield predictable results" (*KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 401 (2007)). Honda teaches wireless watch charging and sensors for measuring pulse/heart rate of the body (EX1006 6:14–20; 8:40–42), motivating a POSITA to look to Kotanagi to "implement a predictable variation" (*KSR* at 401). Thus, there is an express motivation in both references that the subject matter in each should be combined with the other. *See id.* (noting that such a teaching, suggestion, or motivation (TSM) is helpful to show obviousness). EX1003 ¶155.

Moreover, existing similarities between the main watch embodiments of Kotanagi and Honda would have caused a POSITA to expect success when combining features or inserting components from one into the other. Both have a watch shape, both have biosensors, and both have a cover glass over an opening in the bottom face of the watch. As explained above, e.g., in § IV(A)(1)(g), components from Honda would have readily fit within or otherwise combined with Kotanagi's embodiments. For example, a POSITA would have readily implemented Kotanagi's teachings using structures for contactless or wireless charging from Honda. EX1003 ¶156.

Although Fraser is not cited in Ground 1, Fraser provides evidence that it would have been feasible to make the second modification option discussed above: to enlarge Kotanagi's opening and cover glass to make room for a coil behind the cover glass, surrounding the LED and PD. Fraser teaches a biosensing watch with a wireless "charging coil 310 surrounding the light emitters 120, 322, 324, and 326 and the light detector 130." EX1041 [0026]:



EX1041 at 4. Fraser teaches that "[t]he light emitters 120, 322, 324, and 326 and the light detector 130 can be placed in the middle of the charging coil 310 to reduce the thickness of the apparatus." EX1041 [0026]. Fraser thus provides evidence of both the feasibility of such a modification, as well as a motivation for this approach (e.g., to reduce apparatus thickness). EX1003 ¶¶157–158.

For these reasons and those explained above, a POSITA would have been motivated to combine Honda and Kotanagi. These motivations to combine also

apply to the other Ground 1 combinations and dependents from Claim 7. Further motivations to combine are provided throughout this petition and Dr. Duckworth's declaration. EX1003 ¶159.

2. Dependent Claim 11

Claim 11 depends from Claim 7 and further adds, "**wherein: the cover forms a waterproof seal with the housing along a perimeter of the cover**."

Kotanagi teaches covering its wired charging terminal to protect the terminal from "water droplets, dust, or the like." EX1005 ¶53. Kotanagi then suggests replacing the terminal and instead "recharg[ing] the rechargeable battery 13 in a contactless state." *Id.* Thus, Kotanagi recognizes contactless charging as a solution for preventing "water droplets, dust, or the like" from penetrating the device.

Similarly, Honda teaches the benefits of stronger "waterproofness":

> If the charging and the signal transmission are performed through electrical contacts in such a system, the contacts are exposed and the apparatus is **weak in terms of waterproofness**. **For this reason**, the charging and the signal transmission are preferably performed in a non-contact fashion, through the electromagnetic coupling between coils respectively arranged in the station and the portable electronic apparatus.

EX1006 1:24–31 (emphasis added). Honda teaches that by "arranging a high-rigidity glass on the surface to which the primary coil and the secondary coil face,

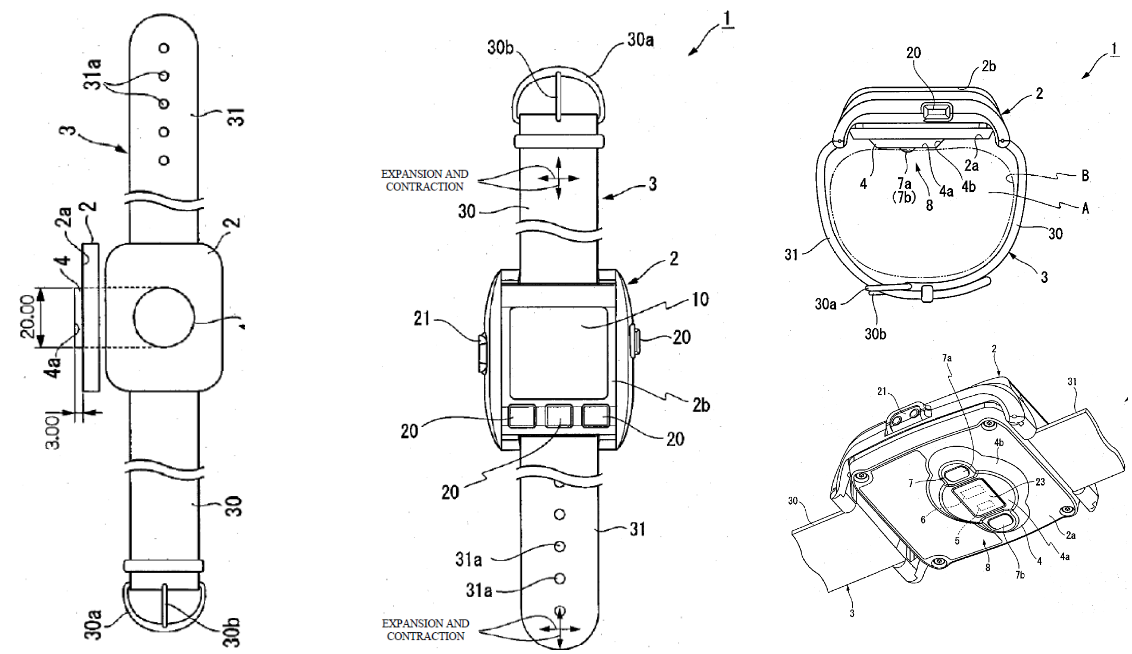
a compact and **waterproof electronic apparatus** is provided." EX1006 15:36–38 (emphasis added). Honda teaches a watch that is waterproof up to five atmospheres. *Id*. 13:22–25. EX1003 ¶¶161–163.

From the above, a POSITA would have recognized the water droplet problem from Kotanagi and that Honda's "cover forms a waterproof seal with the housing along a perimeter of the cover" as claimed. A POSITA would have expected to successfully achieve a water-tight seal (and be motivated to establish such a seal) in Kotanagi not only because of Honda's success, but also based on the general knowledge of watches successfully using sealants, rubber gaskets, etc. to prevent moisture from harming internal electrical components, allowing watch wearers to wash hands, swim, and dive. Thus, a POSITA would have found it obvious to employ a rear cover that forms a waterproof seal with the housing. EX1003 ¶164.

3. Independent Claim 14

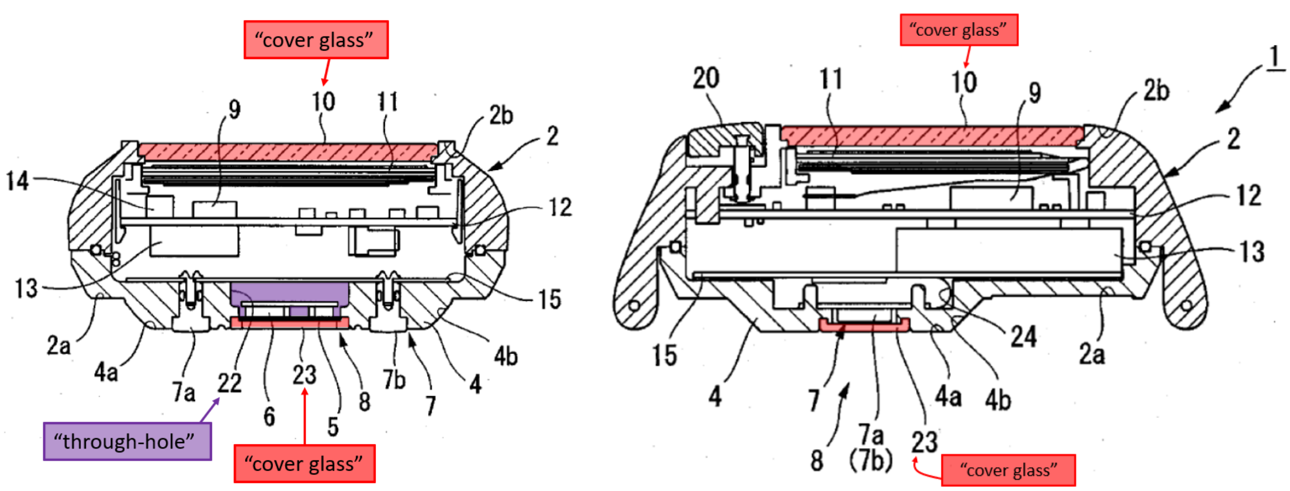
a. [14a] "An electronic device comprising: a housing defining a first opening and a second opening;"

Kotanagi teaches an electronic device as shown below:



Id. at 23, 24, 26, 28 (Figs. 1, 2, 8, 5). EX1003 ¶165.

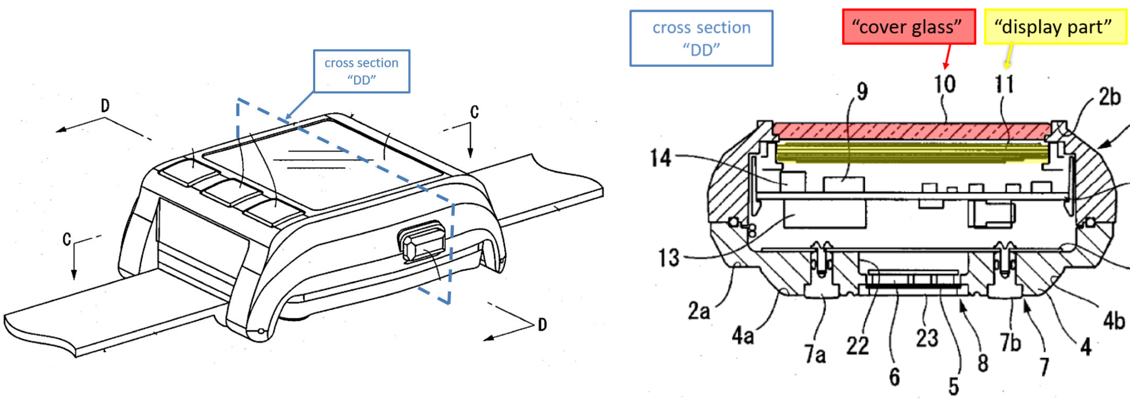
Kotanagi's housing has a "first opening" at the top and a "second opening" ("through-hole 22") at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings:



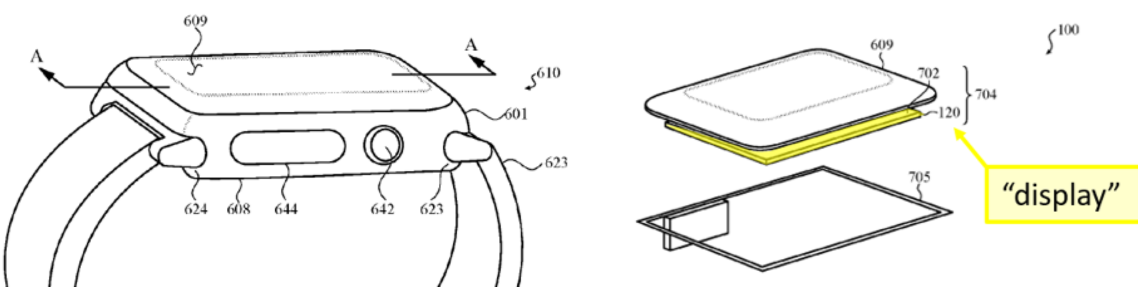
EX1005 at 27 (Figs. 7, 6). EX1003 ¶¶166.

b. [14b] "a display positioned at least partially within the first opening;"

Kotanagi teaches "A cover glass 10 . . . is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 . . . is disposed inside the cover glass 10." Ex 1005 ¶48.



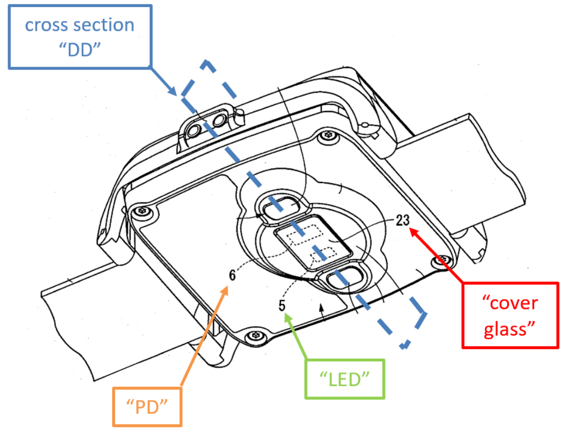
See id. at 25, 27 (Figs 5, 7). This is consistent with the '491 patent's display, which is also under a cover glass in the opening.

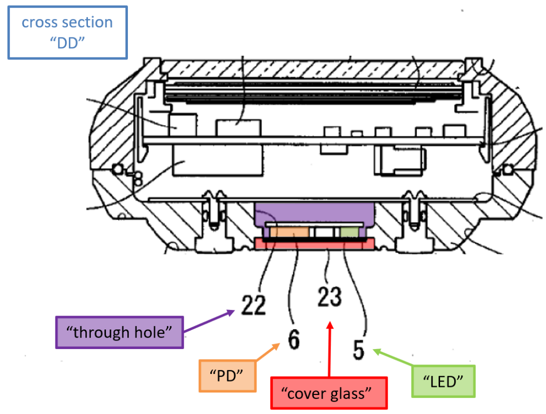


See EX1001 at 12–13 (Figs. 6, 7). Accordingly, Kotanagi teaches this limitation. EX1003 ¶¶167–168.

c. [14c] "a biosensor module aligned with the second opening;"

Kotanagi teaches a "biological sensor part" aligned with the opening:





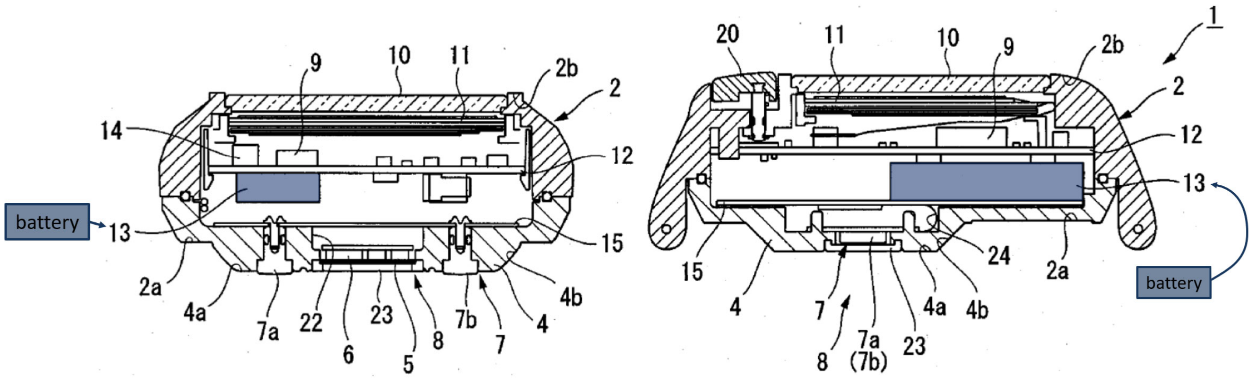
See EX1005 at 26, 27 (Figs. 5, 7). "The LED 5 and the PD 6 are disposed adjacent to one another ... so as to touch the inside of the glass cover 23." EX1005 ¶55. EX1003 ¶¶169–170.

d. [14d] "a wireless charging receive coil positioned within the housing and aligned with the second opening;"

These features are obvious in view of Honda and Kotanagi, as explained for limitation **7g**. The evidence and analysis above showing the coil is "below the cover" also shows it is "positioned within the housing." EX1003 ¶¶171–176.

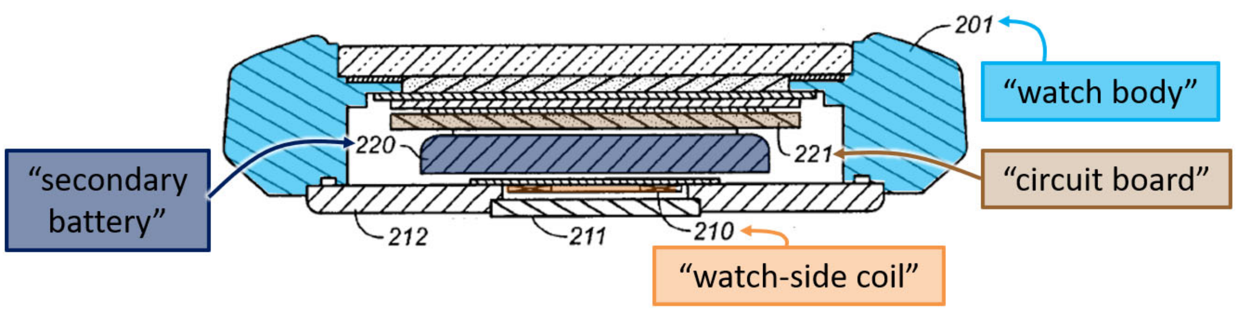
e. [14e] "a battery operably coupled to the wireless charging receive coil; and"

Kotanagi teaches a "rechargeable battery 13," which can be connected for "contactless," or wireless, charging. EX1005 ¶53. The battery is illustrated in the cross-sections of Kotanagi's Figures 6 and 7:



See EX1005 at 27 (Figs. 6, 7). EX1003 ¶177.

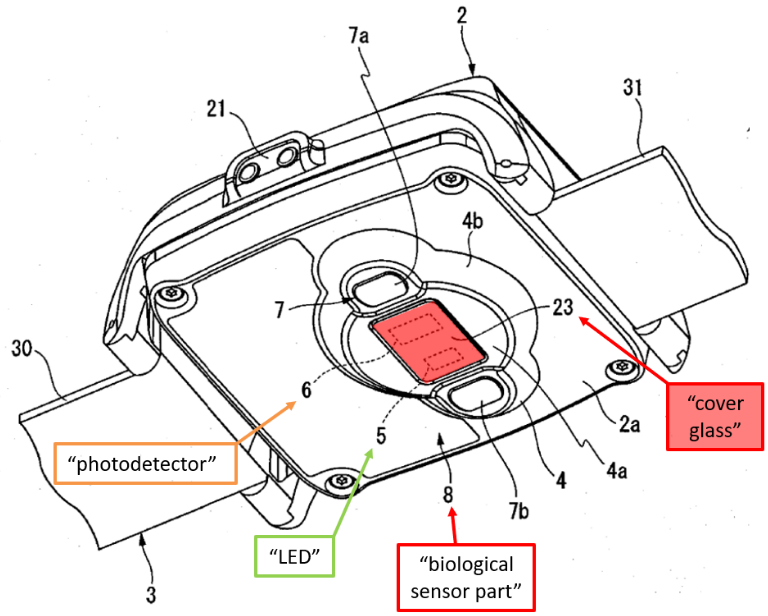
Honda specifically teaches a rechargeable battery coupled to a wireless charging coil: "The watch body 201 includes a circuit board 221, connected to a secondary battery 220 and a watch-side coil 210." EX1006 6:25–27.



See id. at 3 (Fig. 2). To obtain power, a POSITA would have included a coil in the Kotanagi device and connected it to Kotanagi's battery, as taught by Honda's battery connection from coil to battery. EX1003 ¶¶178–179.

f. <u>[14f] "a cover formed from an optically transparent material and disposed over the biosensor module and the wireless charging receive coil, wherein:"</u>

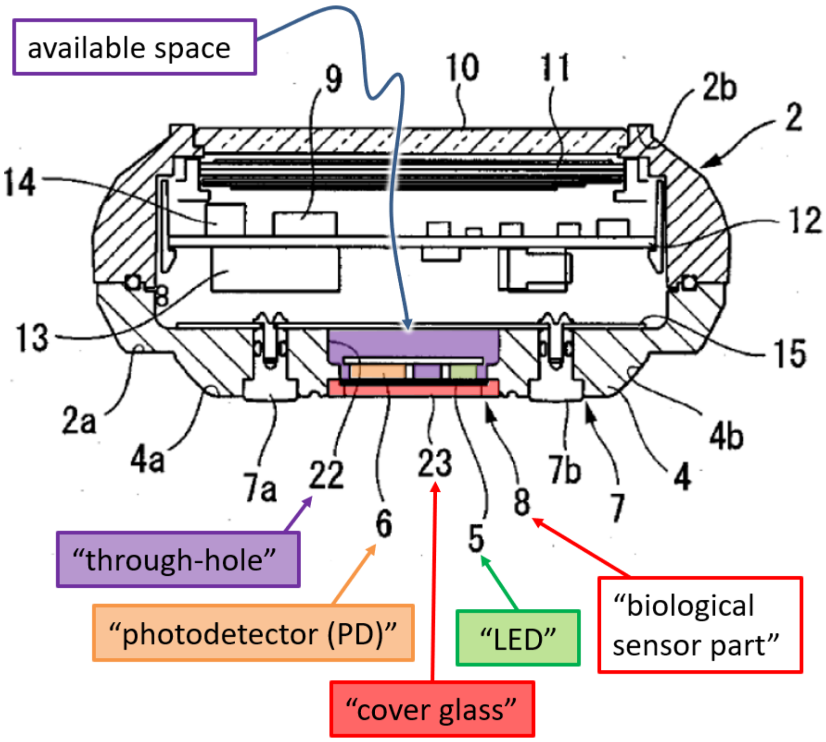
Kotanagi illustrates its photodetector 6 and LED 5 with dashed lines to indicate they lie behind the cover glass 23, forming an optical "biosensor module":



See EX1005 at 26 (Fig. 5). Kotanagi's cover glass is optically transparent, because from their positions behind this cover the "data processing part 9 emits light from the LED 5 toward the living body" and the "[t]he PD 6 receives … reflected light." EX1005 ¶65. EX1003 ¶¶180–181.

Honda's cover glass is also optically transparent: "since the glass member is typically transparent, the internal coil and electronic components are seen through the glass cover from the outside." EX1006 13:53–55. EX1003 ¶182.

The discussions of limitations **14d** and **7g** above explain why it would have been obvious to position Honda's coil within the housing aligned with the second opening (e.g., in the available space illustrated below).



See EX1005 at 27 (Fig. 7). This same positioning and alignment would have disposed the cover "over the biosensor module and the wireless charging receive coil," as claimed here. EX1003 ¶¶183–185.

g. <u>[14g] "the electronic device is configured to receive wireless power through the optically transparent material of the cover using the wireless charging receive coil; and"</u>

The discussion of limitation **7g** above explains why Kotanagi and Honda teach a wireless charging receive coil configured to "inductively couple" to an external charging device. This inductive coupling is how a device receives wireless power, and the same analysis applies here. To summarize, Kotanagi teaches "contactless" charging. EX1005 ¶53, ¶55. Honda provides further details, explaining how magnetic flux forms between two coils, traversing the cover glass:

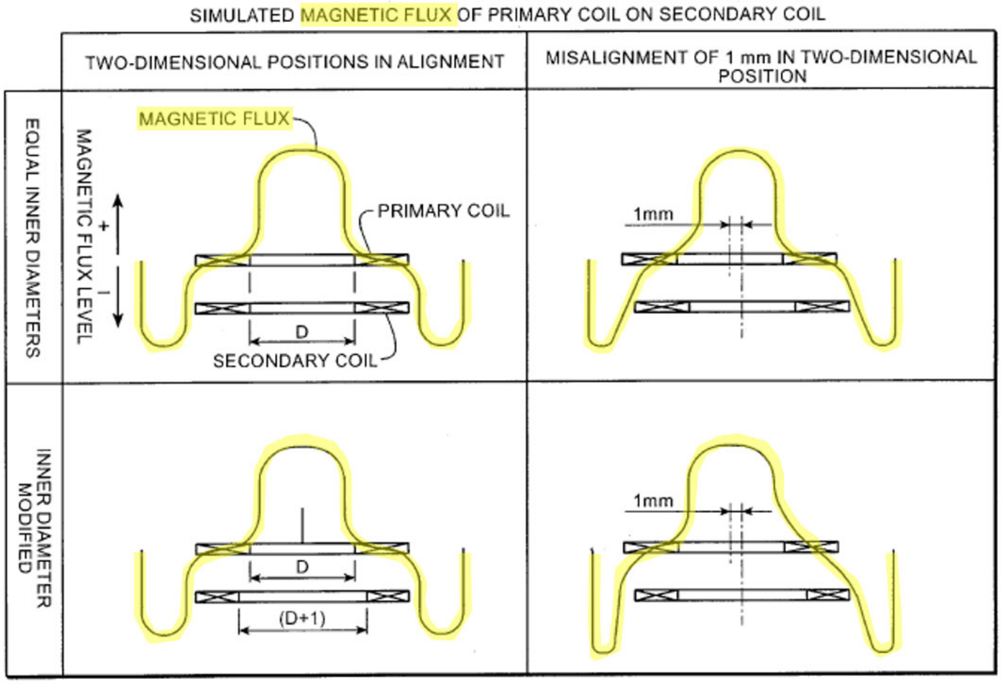


FIG._10

EX1006 at 9 (Fig. 10); *see* EX1006 6:28–35. A POSITA would have understood (from Honda and/or general knowledge) that this magnetic flux sends wireless power through the cover to charge the watch battery, in an arrangement like this:

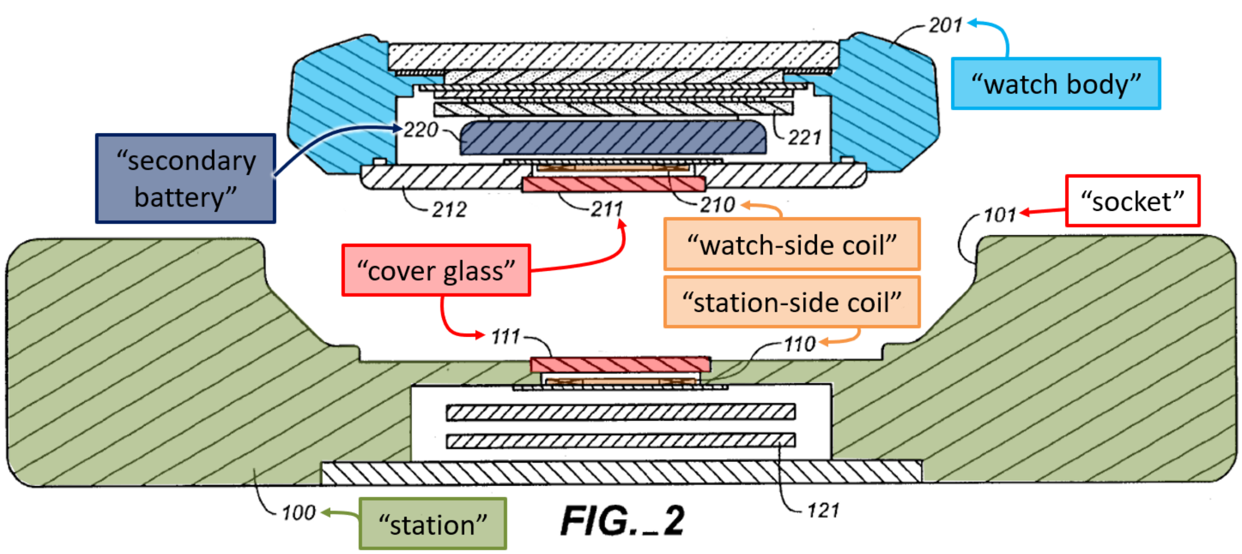
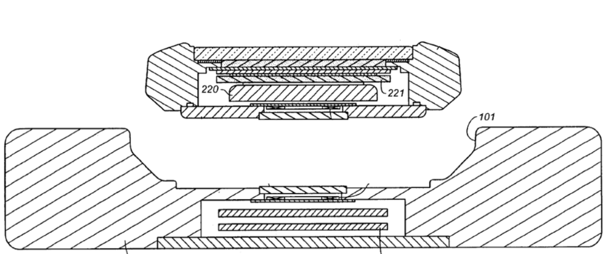
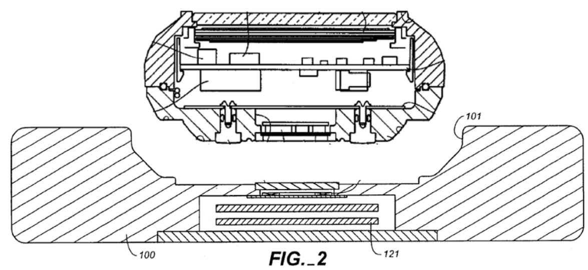


FIG._2

See id. 1006 at 3 (Fig. 2). Because the Kotanagi and Honda watch devices are so similar, Kotanagi's device as modified would fit within (and interact similarly with) at least a scaled version of Honda's charging station.

Honda's watch, with Honda's station (*see* EX1006 at 3):	Kotanagi's watch, with Honda's station (*see* EX1006 at 3, EX1005 at 27):
 FIG._2	 FIG._2

Accordingly, Kotanagi and Honda teach an electronic device configured to "receive wireless power through the optically transparent material of the cover using the wireless charging receive coil," as claimed. EX1003 ¶¶186–192.

h. [14h] "the electronic device is configured to measure a heart rate of a user through the optically transparent material of the cover using the biosensor module."

As explained for limitation **7f**, Kotanagi teaches passing an optical signal through the material of the cover. Kotanagi also teaches measuring a "pulse signal" from reflected light that is transmitted through cover glass: "A portion of the emitted light is absorbed, for example, by hemoglobin in blood vessels, and another portion of the light is reflected by biological tissue. The PD 6 receives this reflected light, generates a pulse signal (biological information signal) corresponding to the amount of received light." EX1005 ¶65. Kotanagi's data

processing part 9 converts the pulse signal into a "pulse rate." EX1005 ¶66. A POSITA would have known that pulse rate is a function of and directly correlated with heart rate, as pulsing fluctuations in blood flow result from and have the same cadence as heart contractions. Honda also teaches that its watch may detect "pulse rate or heart rate of the body through an unshown sensor." EX1006 6:17–20; 8:40–42. For at least these reasons, these limitations are taught by the combination of Kotanagi and Honda. EX1003 ¶193.

i. <u>Motivation to Combine Kotanagi and Honda</u>

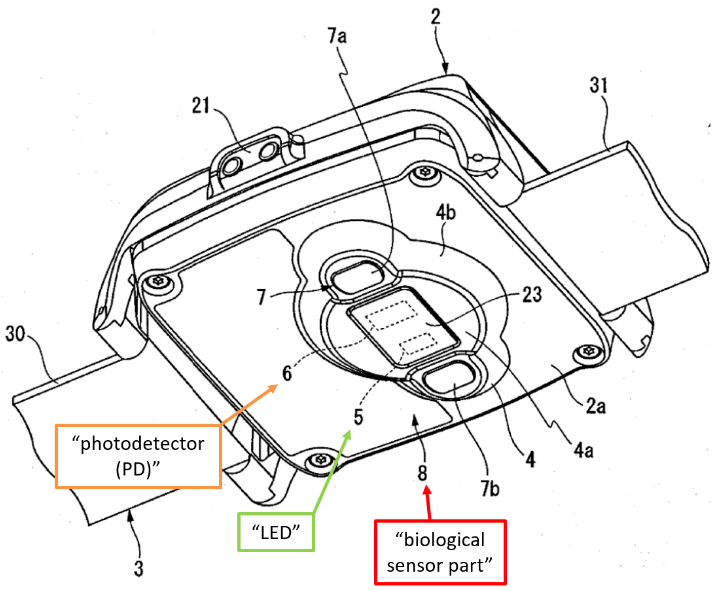
Prior to September 2014, a POSITA would have been motivated to combine Kotanagi and Honda at least for the reasons provided for Claim 7. *See supra* § IV(A)(1)(h). EX1003 ¶194–196.

4. <u>Dependent Claim 16</u>

Claim 16 depends from claim 14 and further adds:

a. <u>[16a] "wherein: the biosensor module comprises: a light source; and a detector;"</u>

Kotanagi teaches the claimed module through its "biological sensor part" comprising an LED (5) and a detector (PD 6):



See EX1005 at 26 (Fig. 5). EX1003 ¶198.

b. [16b] "the light source and the detector are configured to measure changes in light absorption by a region of skin of the user;"

Kotanagi teaches these limitations: "since the amount of reflected light out of the light emitted from the LED 5 varies depending on fluctuations in blood flow within arteries and arterioles in the wrist … the PD 6 can generate a pulse signal." EX1005 ¶65. Thus, Kotanagi's features are configured as claimed. EX1003 ¶199.

c. [16c] "the electronic device is configured to compute the heart rate using the measured changes in light absorption; and"

Kotanagi's device "extracts a pulse signal corresponding to the pulse from the reflected signal, and calculates the pulse rate." EX1005 ¶3. A POSITA would have known that pulse rate corresponds to heart rate, as pulsing fluctuations in blood flow result from and have the same cadence as heart contractions. Honda

also teaches that its watch may detect "pulse rate or heart rate of the body" using a sensor. EX1006 6:17–20; 8:40–42. EX1003 ¶¶200–203.

d. <u>[16d] "the display is configured to display information associated with the heart rate."</u>

Kotanagi teaches "wherein a display part for displaying detected biological information is provided on an upper surface of the main body." EX1005 at 21. Kotanagi teaches "a display part 11 for displaying the . . . pulse rate." *Id.* ¶48. EX1003 ¶¶204–209.

B. <u>Ground 2: Claims 1–3, 5, 13, and 17 are unpatentable because they would have been obvious over Kotanagi in view of Honda and further in view of Choi.</u>

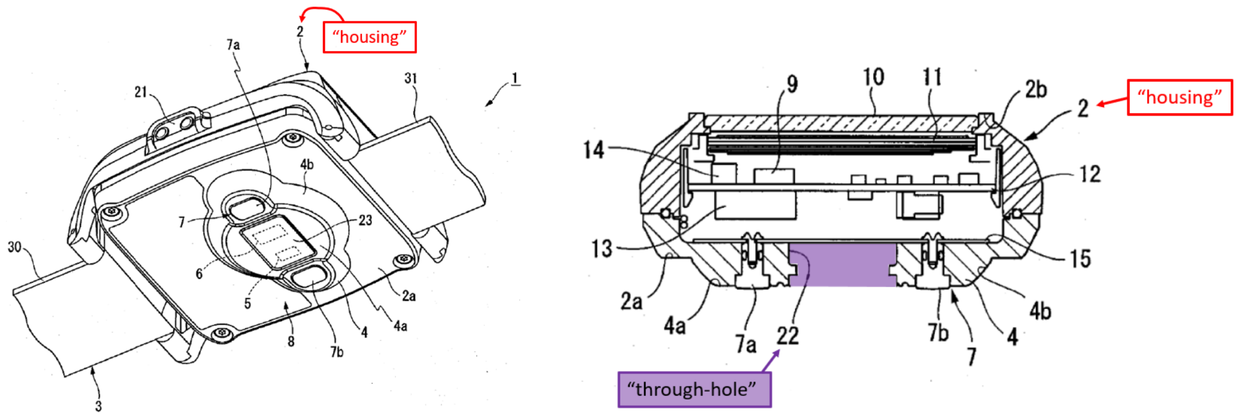
1. <u>Independent Claim 1</u>

a. <u>[1a] "An electronic watch comprising:"</u>

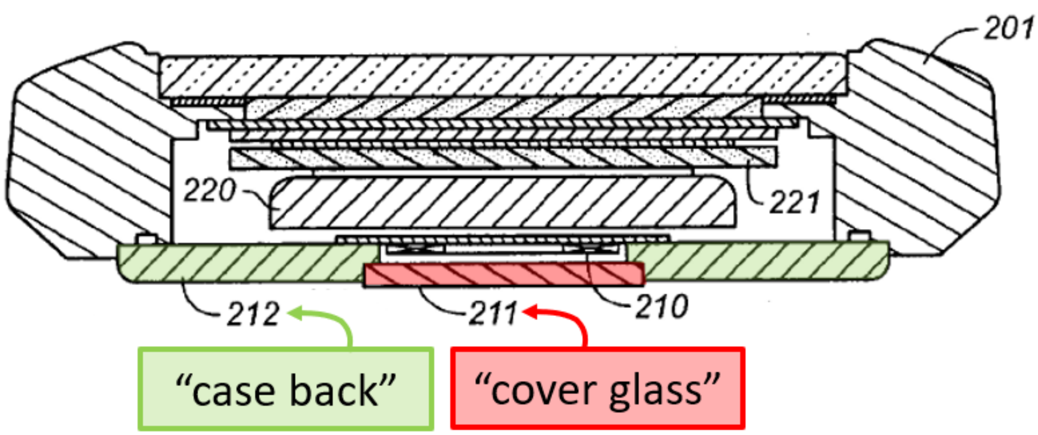
Kotanagi teaches a "wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist." EX1005 ¶44. EX1003 ¶210.

b. <u>[1b] "a housing formed from a metal material and defining a rear opening along a rear portion of the housing;"</u>

These limitations are obvious based on the analysis for limitation **7b**. To summarize, Kotanagi's housing 2 can be made of "a metal material such as aluminum." EX1005 ¶48. A "through-hole 22" is formed in the center of the lower surface" (*id.* ¶55):



See EX1005 at 26, 27 (Figs. 5, 7) (biosensor module removed). Similarly, Honda teaches a case back 212 "typically made of a metal" and a cover glass 211 spanning a rear opening (EX1006 15:47–49):

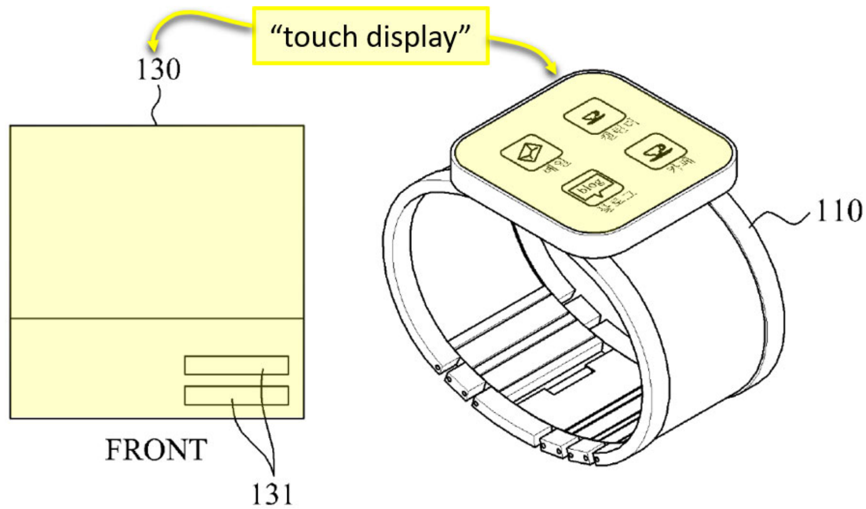


See id. at 3 (Fig. 2). Thus, Kotanagi and Honda teach these features. EX1003 ¶¶211–213.

c. **[1c] "a touch-sensitive display positioned at least partially within the housing;"**

Kotanagi teaches a "liquid crystal display device" that may display information based on "input from each button 20." EX1005 at 11.

In the same field of endeavor, Choi teaches a biosensing watch. A "surface" of this device has "a display visible to the user, for example, a touch display" that it describes as "a front 130" (EX1023 [32]; EX1011 [43]):



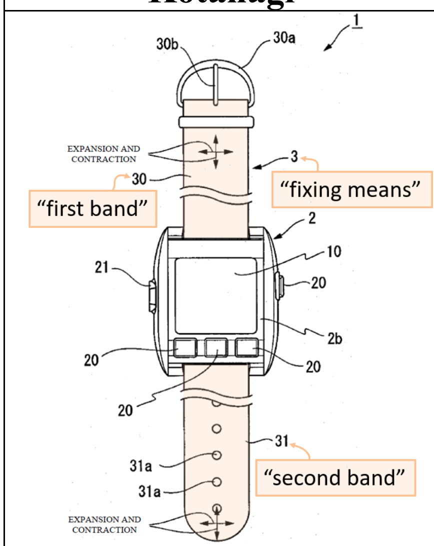
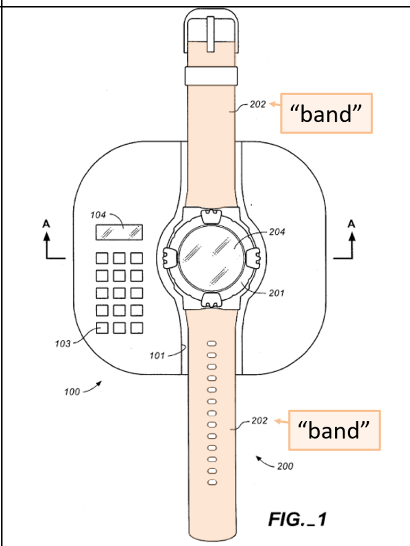
See EX1023 at 28 (Fig. 1); EX1011 at 24 (Fig. 1). EX1003 ¶214.

A POSITA would have been motivated to incorporate a touchscreen in Kotanagi as it reduces the need to provide buttons on the front side of Kotanagi's device. Incorporating a touchscreen would increase the size of Kotanagi's screen (without expanding device size), reduce the number of separate components and moving parts in Kotanagi's device (reducing mechanical failure risk), and provide additional functionality not enabled by hardware buttons alone (a touchscreen or virtual "buttons" can be programmed for varying situations and functions, while the changing screen can provide context to reduce a need for user training).

Further, touchscreens were known in the art,[9] and this combination provides "familiar elements" that do "nothing more than yield predictable results." *See KSR,* 550 U.S. at 416. EX1003 ¶215–216.

d. [1d] "a band coupled to the housing and configured to couple the electronic watch to a user;"

These features are taught by Kotanagi, as shown for limitation **7c**. A band configured to "secure" the "device" to a user is also configured to "couple" the "watch" to a user. Honda and Choi also have such bands:

Kotanagi	Honda	Choi
 *See* EX1005 at 23 (Fig. 1).	 *See* EX1006 at 2 (Fig. 1).	 *See* EX1023 at 3, 28 (Fig. 1); EX1011 at 24 (Fig. 1).

EX1003 ¶217.

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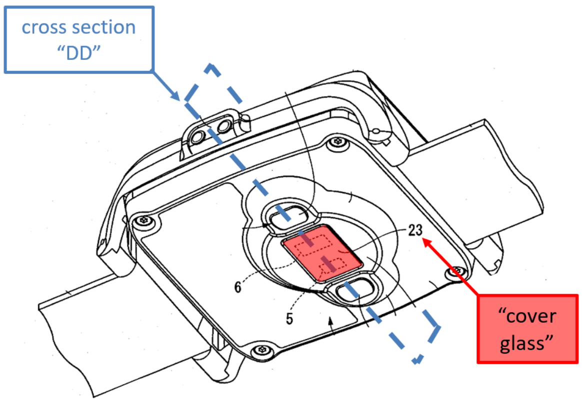
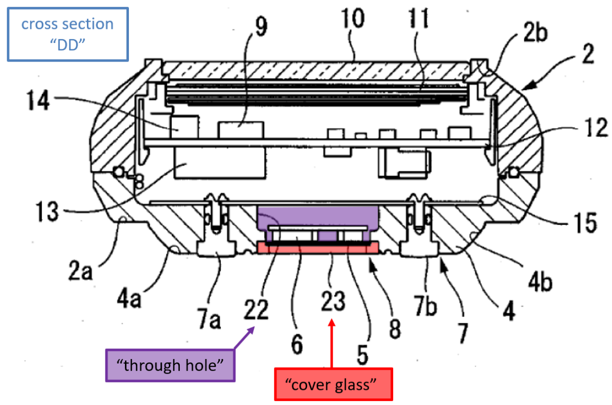
[9] *See* EX1041 [0020] (biosensing watch with a "touch screen display"); EX1016 [0046] (biosensing watch with "touch sensitive screen inputs"); EX1020 5:5 ("touch screen" for a biosensing watch).

e. [1e] "a cover formed from a dielectric material and forming a seal along the rear opening of the housing;"

Kotanagi teaches a "a cover glass 23 is fixed to the housing 2." EX1005 at 12. This forms a seal over the through-hole in the rear opening:

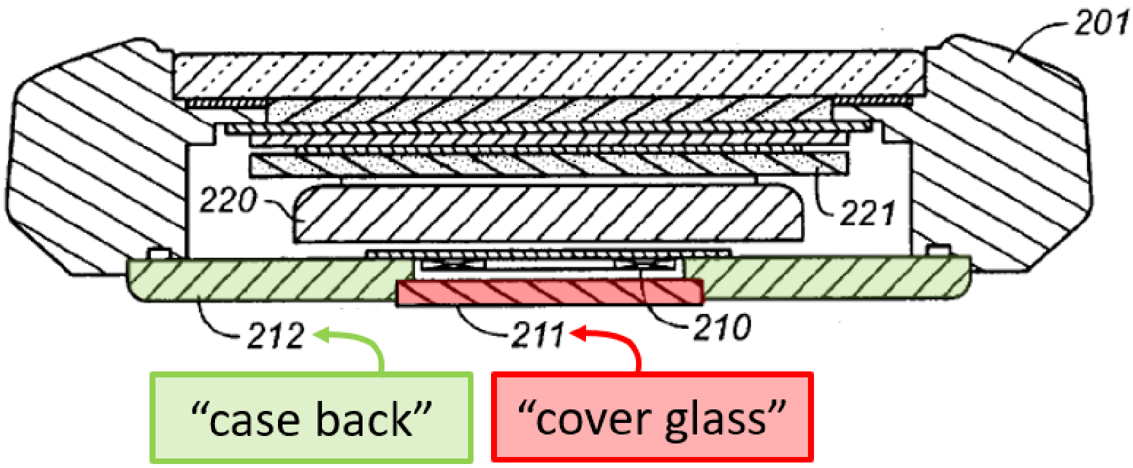




See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶218.

A POSITA would have known that Glass is a non-conductive material, and Honda teaches this. EX1006 15:62 ("insulating body (glass, for example)"). Dependent Claim 3 (analyzed in Ground 2 below) states that the '491 cover is glass or sapphire, confirming that the applicant considered glass a dielectric. Thus, a POSITA would have understood Kotanagi's "cover glass 23" teaches this limitation. EX1003 ¶219.

Moreover, Honda teaches a cover glass 211 that forms a seal around Honda's rear opening:

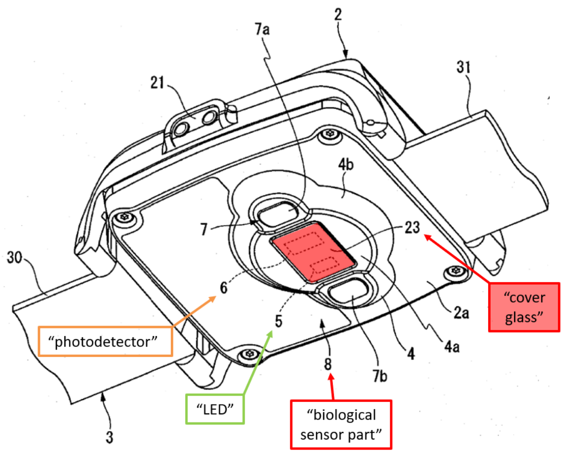


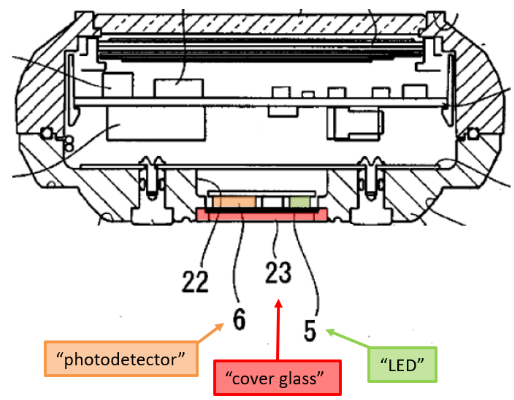
See EX1006 at 3 (Fig. 2). Honda teaches that its cover glass "may be replaced with other insulating materials." *Id*. 16:14–15. EX1003 ¶¶220–221.

As shown for Claim 11 (*supra* § IV(A)(2)), Kotanagi is concerned with protecting from "water droplets" (EX1005 ¶53) and Honda teaches "waterproofness" (EX1006 1:24–31; 15:36–38) up to five atmospheres (*id*. 13:22–25). Thus, a POSITA would have understood from these references that insulating dielectric materials may be used to both cover and seal the rear opening of a watch. EX1003 ¶¶222–223.

f. <u>[1f] "an optical sensor positioned within the housing and configured to transmit an optical signal through the dielectric material of the cover;"</u>

Kotanagi teaches an LED "for emitting light toward the living body" and a photodetector "for receiving reflected light from the living body." EX1005 ¶46. Both are positioned within the housing immediately behind the cover glass:

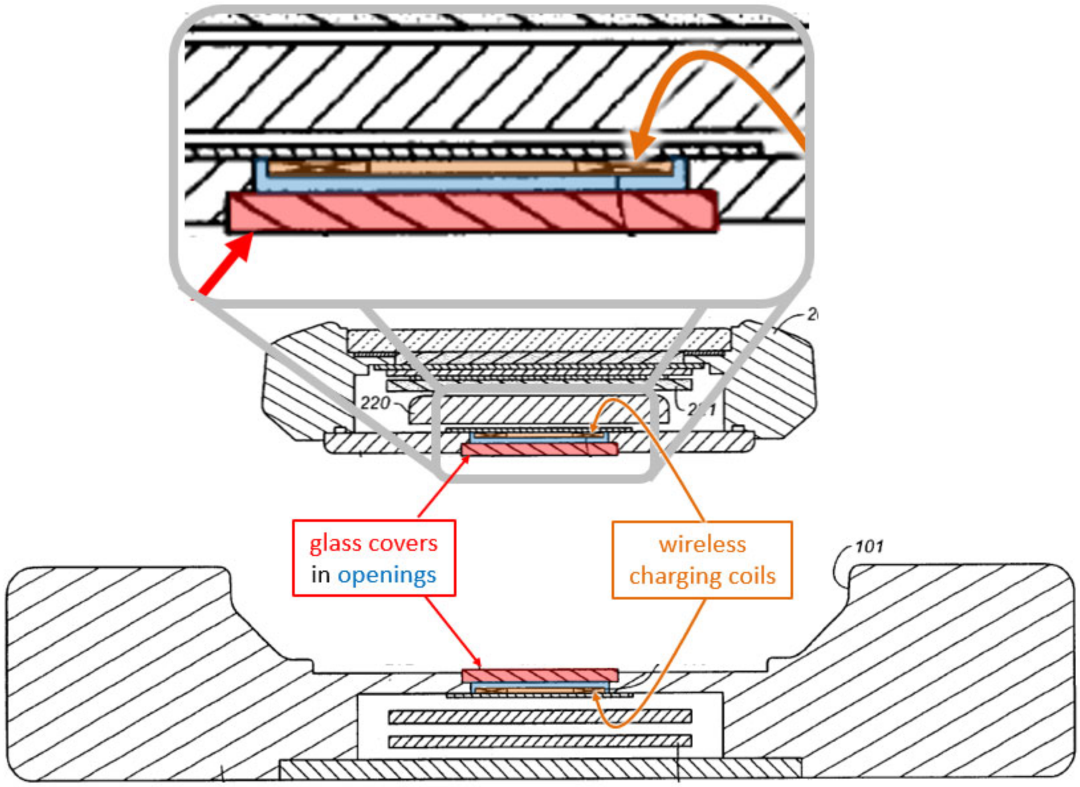




See EX1005 at 26, 27 (Figs. 5, 7). A POSITA would have understood that because Kotanagi's cover glass 23 "block[s] the through-hole 22" (EX1005 ¶55), its LED and photodetector transmit and receive optical signals *through* the cover glass. Thus, Kotanagi's teachings satisfy this limitation. EX1003 ¶224–225.

g. [1g] "a charging coil positioned within the housing and configured to receive wireless power through the dielectric material of the cover;"

The discussion of limitation **7g** above explains why Kotanagi and Honda teach a charging coil "aligned with the second opening and below the cover"; this is also "within the housing" as claimed here. That discussion also explains how Kotanagi and Honda teach a coil configured to "inductively couple" (transferring power) through a "non-conductive" (dielectric) cover. Accordingly, the **7g** analysis also shows how the present limitations are obvious. To summarize, Kotanagi teaches "contactless" recharging (EX1005 ¶53) and Honda shows how to do this (EX1006 4:36) with charging coils through a cover glass:

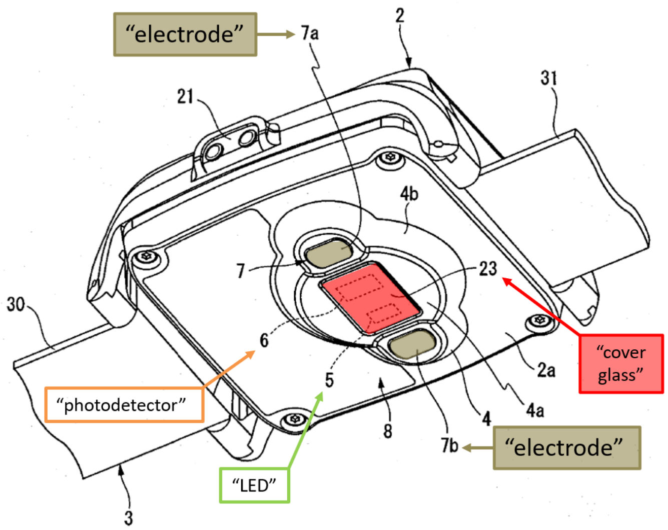


See EX1006 at 3 (Fig. 2). A POSITA would have known to wirelessly charge through dielectric or non-conductive material because Honda teaches that "the use of the conductive member is not appropriate for a high-efficiency transmission." EX1006 13:30–31; *see id*. at 14 (Fig. 15). EX1003 ¶226–227.

A POSITA would also have known to pass power through the glass based on general knowledge of electrical shielding, teaching that complete metal enclosures prevent electromagnetic charge from penetrating. This is confirmed by Honda's transmission experiments. EX1006 13:33–63. Thus, to achieve the wireless charging goal expressed in Kotanagi, a POSITA would have naturally positioned the coil near the glass-covered opening for power reception. EX1003 ¶¶228–229.

h. [1h] "a first electrode positioned along a rear surface of the electronic watch; and a second electrode positioned along the rear surface of the electronic watch, wherein:"

Kotanagi teaches a pair, or plurality, of electrodes that measures a "potential difference" between them. EX1005 ¶¶59, 86.



See id. at 26 (Fig. 5). EX1003 ¶230.

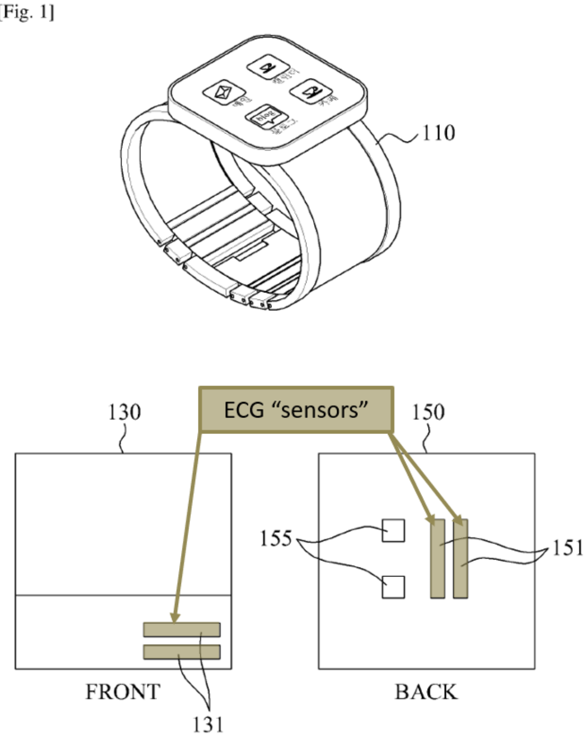
i. [1i] "the electronic watch is configured to measure a heart rate using the optical sensor, and"

As explained for limitation **14h**, Kotanagi teaches measuring a heart rate using the biosensor module (which includes the optical sensor). Kotanagi's watch "generates a pulse signal (biological information signal) corresponding to the amount of received light" reflected from blood vessels. EX1005 ¶65. Honda's watch also "detects biological information including the pulse rate or the heart rate of the body." EX1006 6:17–19. Accordingly, the claimed combination of Kotanagi and Honda satisfies this limitation. EX1003 ¶231.

j. [1j] "the electronic watch is configured to measure an electrocardiogram using the first electrode and the second electrode."

Kotanagi's rear electrodes interact with the optical sensor to achieve pulse measurement. In the same field of endeavor, Choi uses electrodes to directly obtain an electrocardiogram: "To detect the ECG signal . . ., a signal detected in at least two different portions of the body of the user may be needed, and thus, the sensors 131 and 151 are provided on the front 130 and on the back 150, respectively" (EX1023 [45]; EX1011 [52]):

[Fig. 1]

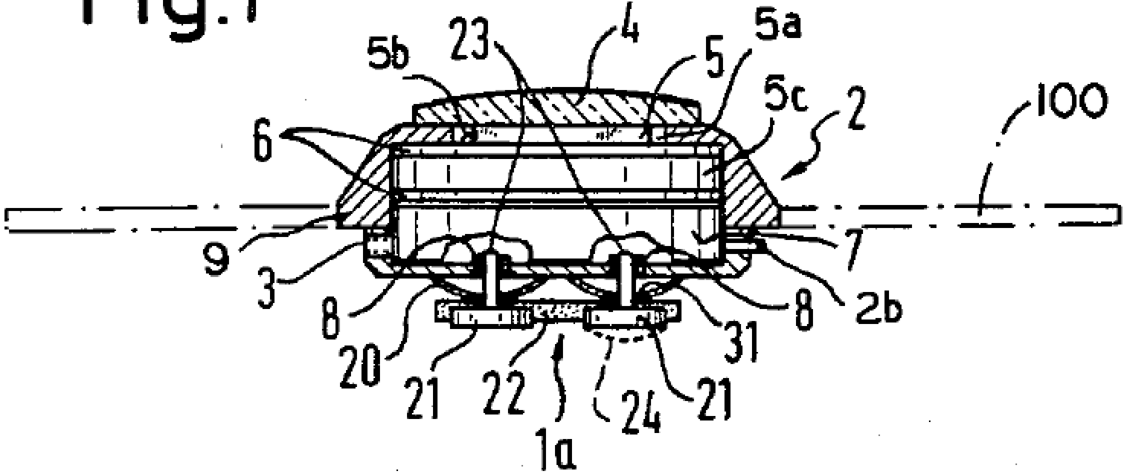


See EX1023 at 28 (Fig. 1); EX1011 at 24 (Fig. 1). EX1003 ¶232.

In view of Kotanagi's alternative teachings—e.g., the electrodes "need not be a pair, and a plurality of electrodes, for example, may be provided" (EX1005

¶14, *see* ¶86) and Choi's teaching that front and back sensors may not be needed (EX1023 [45]; EX1011 [52])—a POSITA would have considered alternative electrode arrangements for ECG measurement. A POSITA would have known by September 2, 2014 (given its availability in at least 1980), that a pair of ECG electrodes can be spaced as close as 4–5 mm on the back of a watch (EX1029 3:7–15), as well as for surgical applications, and remain accurate (*id*. 4:34–45).

Fig.1



E.g., EX1029 at 2 (Fig. 1). EX1003 ¶233.

In view of this knowledge, a POSITA would have used Kotanagi's existing electrodes and Choi's teachings to either: (1) use signals from Kotanagi's existing electrodes to obtain an ECG; or (2) add one or more additional electrodes to Kotanagi (as taught by Choi) and use both it and the existing electrodes to obtain an ECG. Limitation **1j** does not require that the first and second electrodes are the

only electrodes used to measure the ECG. Thus, under either of these scenarios, Kotanagi, Honda, and Choi render obvious limitation **1j**. EX1003 ¶233.

k. Motivation to Combine Kotanagi, Honda, and Choi

The reasons to combine Kotanagi and Honda provided above (e.g., *supra §* IV(A)(1)(h)) also apply here. These include the teachings of both Kotanagi and Honda—e.g., for wireless charging. Both were owned by Seiko companies, suggesting that they would have both been available to a POSITA having one or the other. This and their underlying similarities (wrist-watch shapes, biosensors toward the wrist, similar cover glass, available space for a coil, etc.) would have caused a POSITA to expect success in combining them. EX1003 ¶234.

A POSITA would have also been motivated before the effective filing date to expect success in combining the teachings of Kotanagi and Choi, because they both teach a watch with both optical and electrode biosensors. Kotanagi teaches "a plurality of electrodes" to detect electrical potential of skin contact. EX1005 ¶¶14,86. Choi teaches similar electrodes, but obtains an ECG or obtains an "impedance signal," which is analogous to the electrical potential taught in Kotanagi. EX1023 [56]; EX1011 [50]. Because Kotanagi already has multiple electrodes, any further modification from Choi (e.g., to process electrode signals differently or to add an electrode) would have involved mere combinations of

familiar elements according to known methods to yield predictable results.[10] *See KSR*, 550 U.S. at 416. EX1003 ¶¶235–241.

Moreover, because Kotanagi's rear electrodes are similarly spaced and positioned (accounting for scale differences) to those of Choi and known 2-electrode devices (*see* EX1029 at 2), configuring them to measure an ECG would thus have been an application of 1980-era technology, with an expectation of success, resulting in a watch with improved biosensing. EX1003 ¶235.

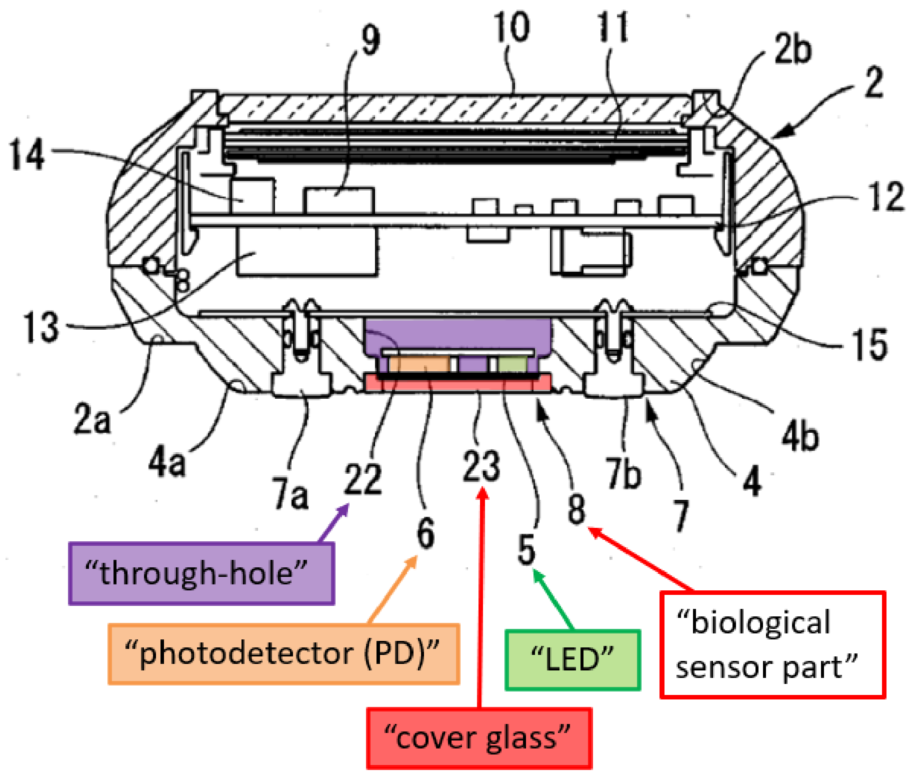
For these reasons and those explained above, a POSITA would have been motivated to combine Choi with Kotanagi as modified by Honda. These motivations also apply to the other Ground 2 combinations and dependents from Claim 1. Further motivations to combine are provided throughout this petition and Dr. Duckworth's declaration. EX1003 ¶241.

2. <u>Dependent Claim 2</u>

Claim 2 depends from Claim 1 and adds **"the cover defines at least one window for the optical sensor; and the cover protrudes outward from a rear housing surface of the housing."**

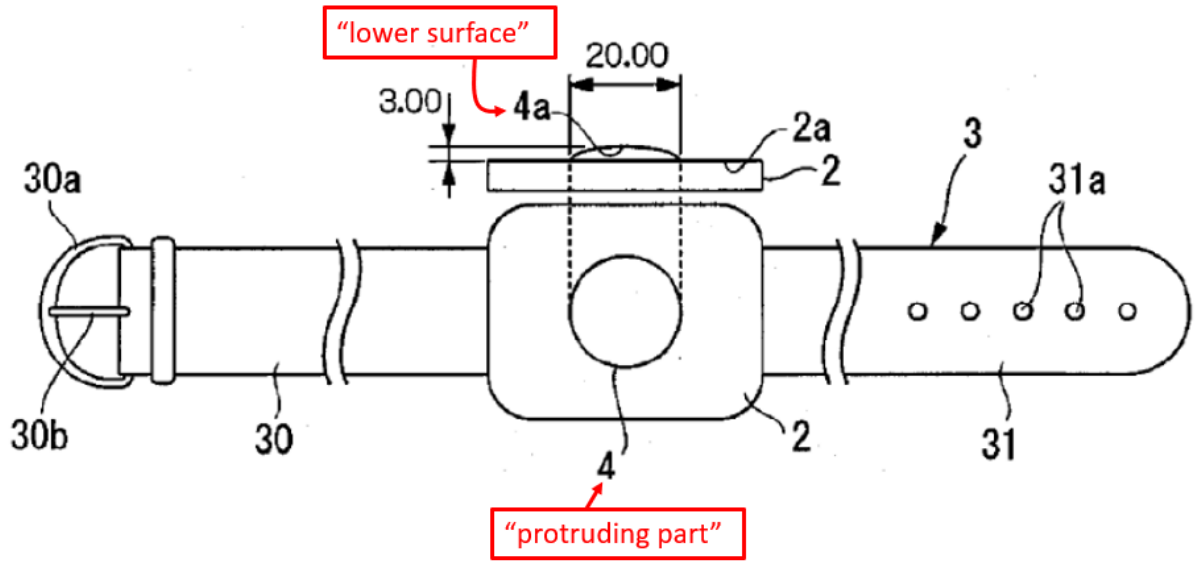
[10] Biosensing watches in various prior art references (e.g., EX1029, EX1027, EX1030, EX1031, EX1033, EX1034, EX1035, EX1008) have ECG measurement capabilities. EX1003 ¶240.

Kotanagi teaches a single opening in its base, with a cover glass, and an LED and a photodetector both positioned in that opening immediately behind the cover glass:



See EX1005 at 27 (Fig. 7). Kotanagi's cover glass 23 covers the opening of through-hole 22, thereby spanning the areas shown for both the LED and photodetector and defining at least one window for them. EX1003 ¶243.

Kotanagi's Figure 10 also shows a disk-shaped protruding part with a curved shape that protrudes away from the housing: "Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10." EX1005 ¶80.



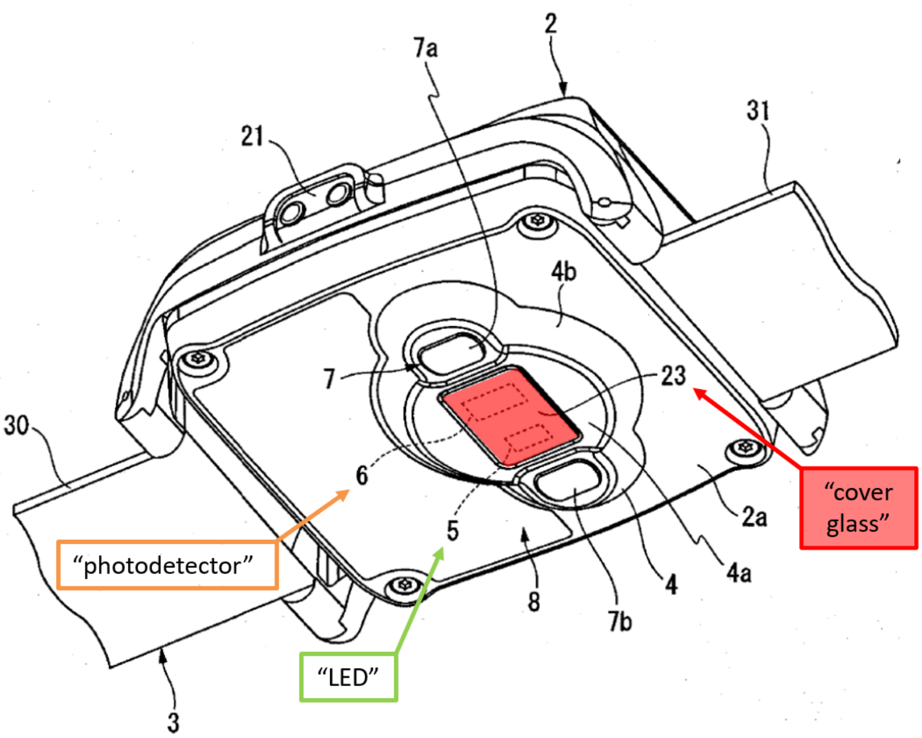
See id. at 28 (Fig. 8). EX1003 ¶¶244–245.

Kotanagi elsewhere includes a cover glass within a "protruding part 4" EX1005 ¶55. Figure 10 does not show a separate cover glass 23, but for Kotanagi's optical detection to function properly, the protruding part 4 must be transparent. Thus, a POSITA would have understood from Kotanagi's Figure 10 that the entire protruding part can form a curved "cover glass" that spans the through-hole 22. *Id.* at 28. Accordingly, a POSITA would have understood that Kotanagi teaches the limitations of Claim 2. EX1003 ¶246.

3. Dependent Claim 3

Claim 3 depends from Claim 1 and adds **"the cover is formed from a transparent substrate; and the transparent substrate comprises one or more of a glass or a sapphire material."**

Kotanagi teaches a "cover glass 23" that allows light to pass through from "LED 5" and is "reflected" from skin such that "PD 6 receives this reflected light." EX1005 ¶65.



See EX1005 at 26 (Fig. 5). Thus, Kotanagi teaches a cover glass that is transparent to light, as the light is transmitted through and reflected back through the cover glass. Honda also uses a cover glass on the rear portion of its watch and teaches that "since the glass member is typically transparent, the internal coil and electronic components are seen through from the outside." EX1006 13:53–55. Accordingly, both references teach that a transparent glass member may be used in an opening on the rear side of a watch, and a POSITA would have understood that

Kotanagi in view of Honda teaches the limitations of Claim 3. EX1003 ¶¶248–249.

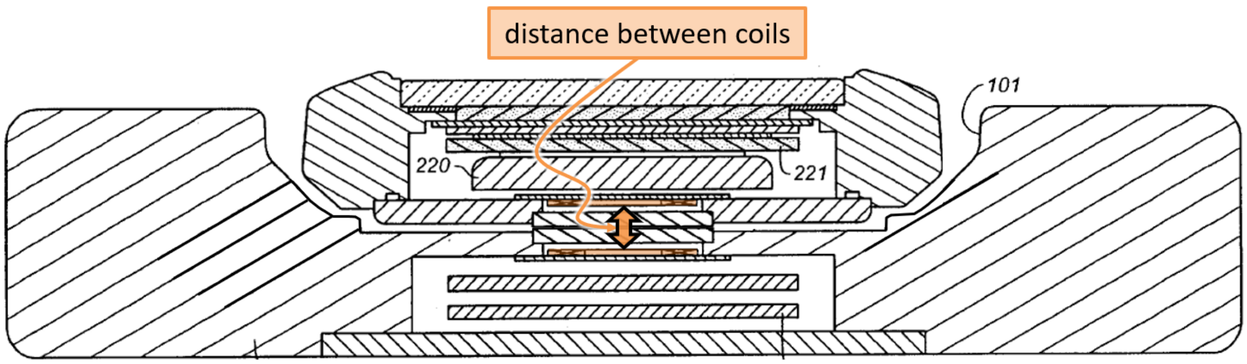
4. Dependent Claim 5

Claim 5 depends from Claim 1 and adds **"wherein: the electronic watch further comprises a near-field communication system; and the near-field communication system is configured to transmit signals through one or more of the housing or the cover."**

Kotanagi teaches that its watch may have "a wireless communication means," e.g., for sending pulse rate and other data to and from a memory; this can be through "wireless communication such as Bluetooth." EX1005 ¶88. A POSITA would have also considered other common wireless protocols such as "near-field communication" ("NFC") based on this teaching. In the prosecution history of the '491 patent, the U.S. Patent Examiner interpreted "near-field communication" broadly: "[prior art reference Hong] includes a near-field communication system (I.e. Bluetooth) configured to transmit signals." EX1002 at 1124. Thus, under the Examiner's construction, Kotanagi's Bluetooth satisfies the near-field communication limitation. EX1003 ¶251.

Honda also teaches that its wireless charging coils may facilitate near-field data transfer to the charging station: "Through the electromagnetic coupling between the two coils, a signal can be transmitted in a two-way communication in

a non-contact fashion from the station to the portable electronic apparatus or from the portable electronic apparatus to the station." EX1006 1:38–42.



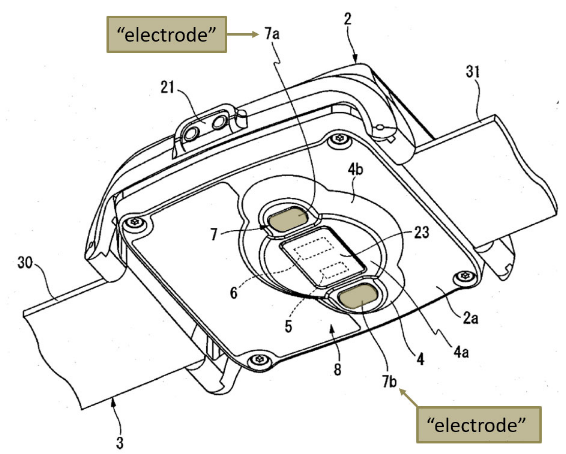
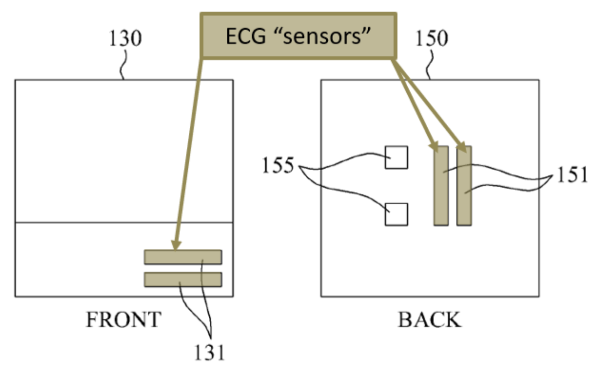
See EX1006 at 3 (Fig. 2). Given that Honda teaches nesting a device almost completely within a socket 101 as shown above, when combining Honda with Kotanagi, a POSITA would have considered "near-field" communication as an example of both Honda's "two-way communication" (EX1006 1:39–40) and Kotanagi's "wireless communication" (EX1005 ¶88). Thus, a POSITA would have found Kotanagi and Honda to teach the Claim 5 limitations. EX1003 ¶¶252–253.

5. <u>Dependent Claim 13</u>

Claim 13 depends from Claim 7 and further adds **"wherein: the wearable electronic device further comprises: a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode positioned along the rear surface of the wearable electronic device; and the wearable**

electronic device is configured to measure an electrocardiographic characteristic using the first and second electrodes."

The discussions of limitations **1h** and **1j** above explain why Kotanagi ("pair of electrodes," EX1005 ¶¶14, 86) and Choi ("sensors" for "ECG signal," EX1023 [45]; EX1011 [52]) teach these limitations. The following figures from these references summarize these teachings:

Kotanagi	Choi
 *See* EX1005 at 26 (Fig. 5).	 *See* EX1023 at 28 (Fig. 1); EX1011 at 24 (Fig. 1).

Thus, a POSITA would have understood that Kotanagi in view of Choi teaches the limitations of Claim 13. EX1003 ¶256.

6. <u>Dependent Claim 17</u>

Claim 17 depends from claim 14 and further adds: "**wherein: the electronic device further comprises: a first electrode disposed along an exterior of the electronic device; and a second electrode disposed along the exterior of the**

electronic device; and the first and second electrodes are configured to measure an electrocardiographic characteristic of the user."

As discussed for limitations **1h** and **1j**, and Claim 13, Kotanagi and Choi teach exterior first and second electrodes and Choi teaches measuring an electrocardiographic characteristic. EX1003 ¶258.

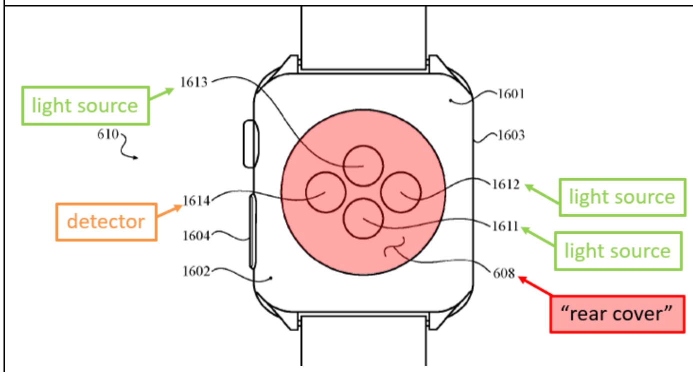
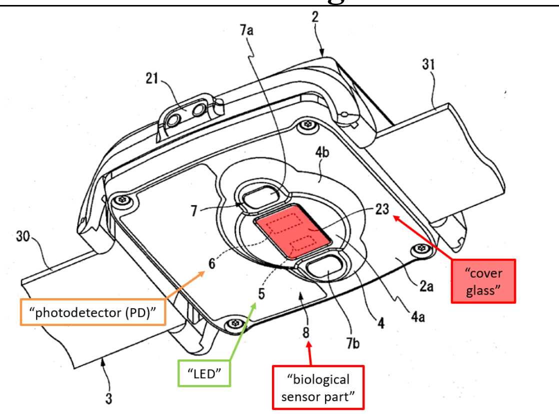
C. Ground 3: Claims 8 and 15 are unpatentable because they would have been obvious over Kotanagi and Honda and further in view of Fraser.

1. Dependent Claim 8

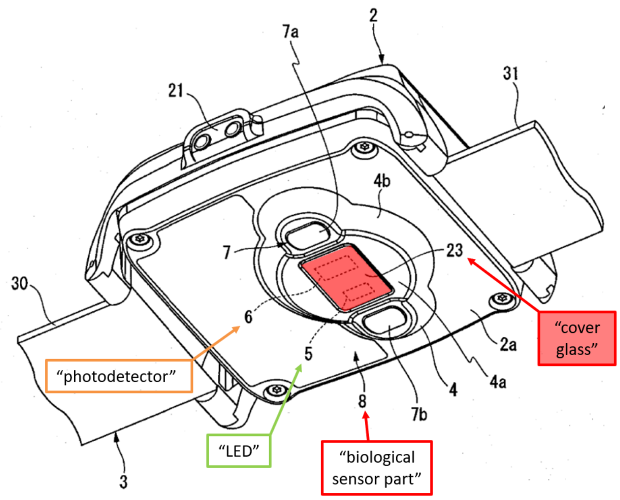
Claim 8 depends from Claim 7 and further adds, "**wherein: the window is a first window; the cover defines a second window; and the biosensor module comprises: a light source configured to emit light toward a region of skin of the user through the first window: and a detector configured to receive light reflected from the region of the skin through the second window**."[11]

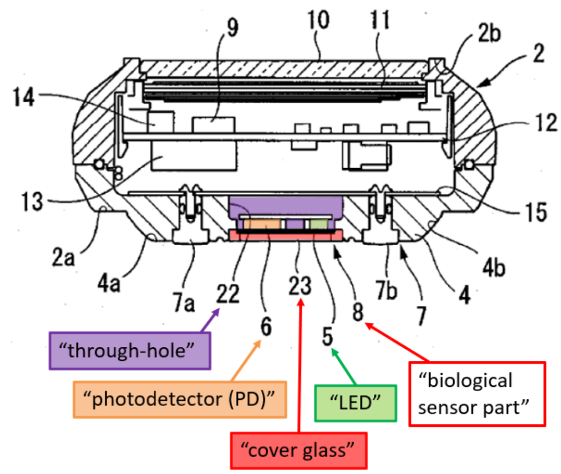
Similar to the '491 patent and consistent with the claim construction provided in § II(F)(2) above, Kotanagi teaches a single opening in its base spanned by a single cover glass:

[11] The second colon in Claim 8 appears to be a typo and is being interpreted as a semicolon.

’491 Patent	Kotanagi
 *See* EX1001 at 22 (Fig. 16).	 See EX1005 at 26 (Fig. 5).

Kotanagi teaches an LED and a photodetector, both positioned in that opening immediately behind the cover glass such that light can travel through the cover glass to and from these features:



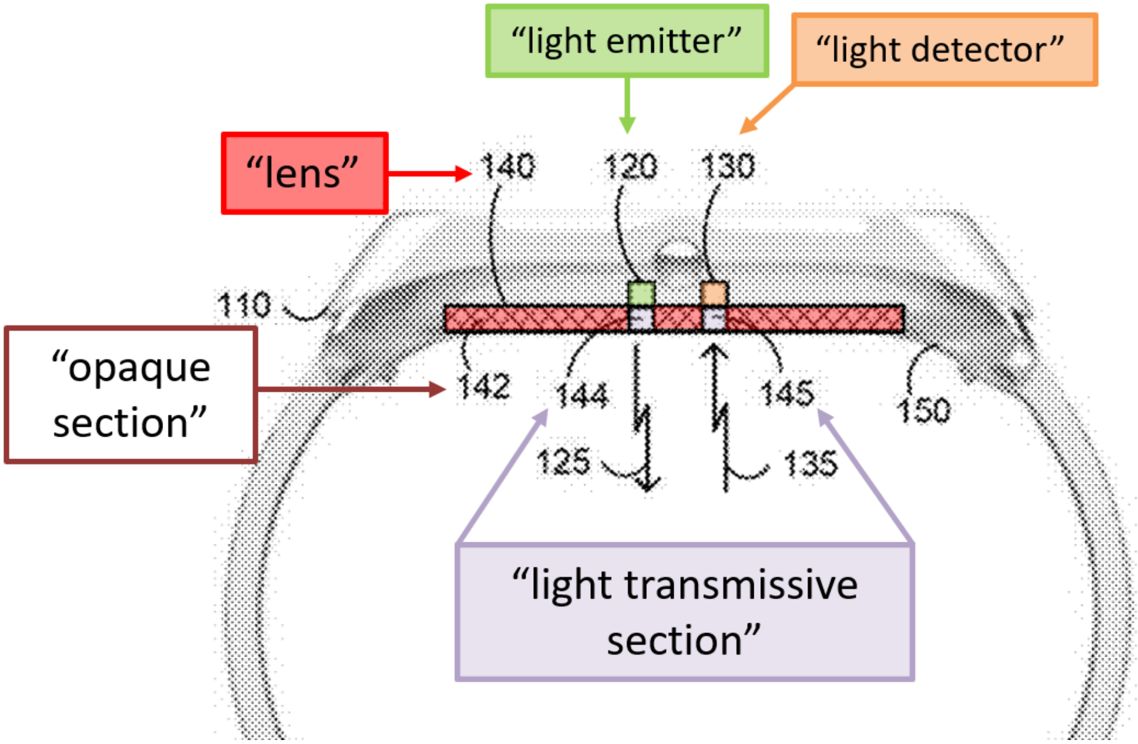


See EX1005 at 26, 27 (Figs. 5, 7). This arrangement provides operational access to both of these features by allowing light to pass through. Kotanagi’s cover glass therefore defines both the first and second windows as claimed. EX1003 ¶¶260–261.

If this claim is interpreted such that there must be two *separate* apertures, the two areas surrounded by dashed lines in Kotanagi's Figure 5 would suggest to a POSITA that two separate windows could be used in those areas. Kotanagi's larger opening is functionally equivalent to the claimed two openings, because it is large enough to accommodate both the transmission and reception of light; creation of two openings instead of one would create no new and unexpected result.[12] EX1003 ¶263.

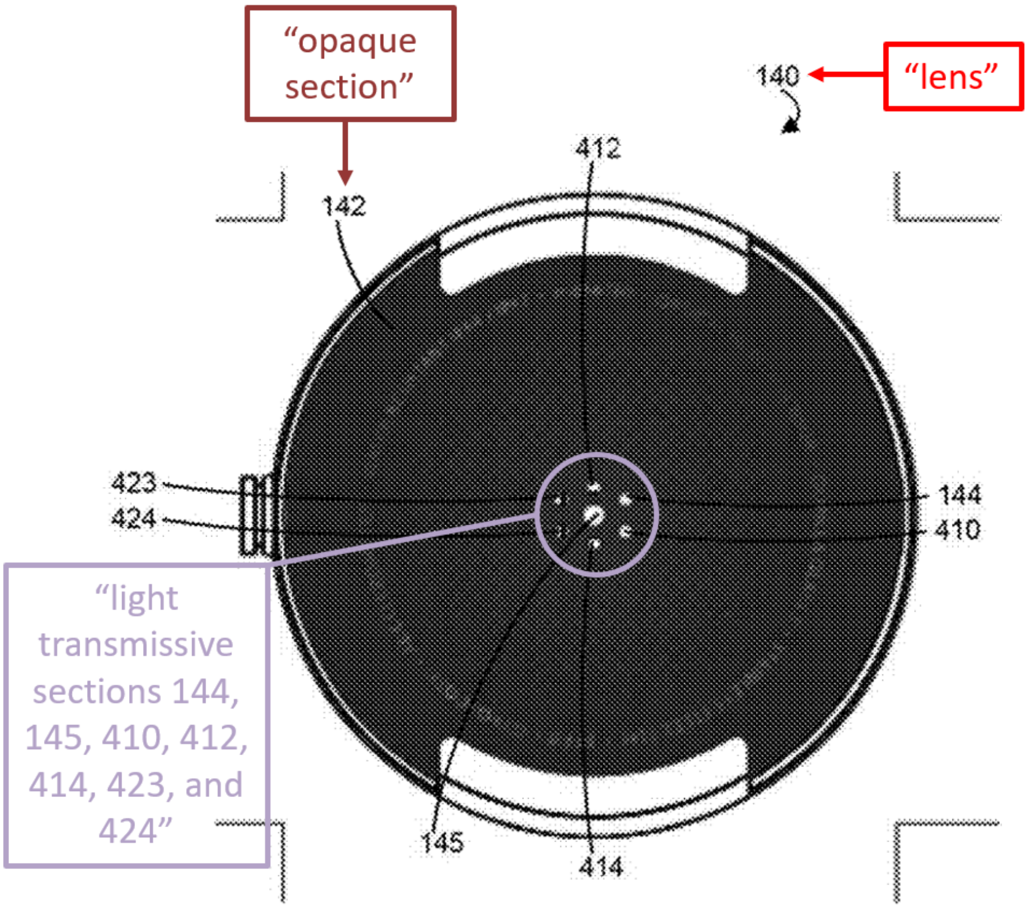
Additionally, Fraser teaches that the back cover of a biosensing watch may be used for "photoplethysmography, pulse oximetry, and other biometric sensing" and that a single cover glass may define openings with light transmissive sections. Fraser's array of "light transmissive sections 144 . . . " can "transmit light from the light emitters 120." EX1041 [0016], [0027]. In this figure, arrow 125 shows light emission:

[12] *See In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) (mere duplication of parts has no patentable significance unless a new and unexpected result is produced.).



See id. at 2 (detail of Fig. 1). EX1003 ¶264.

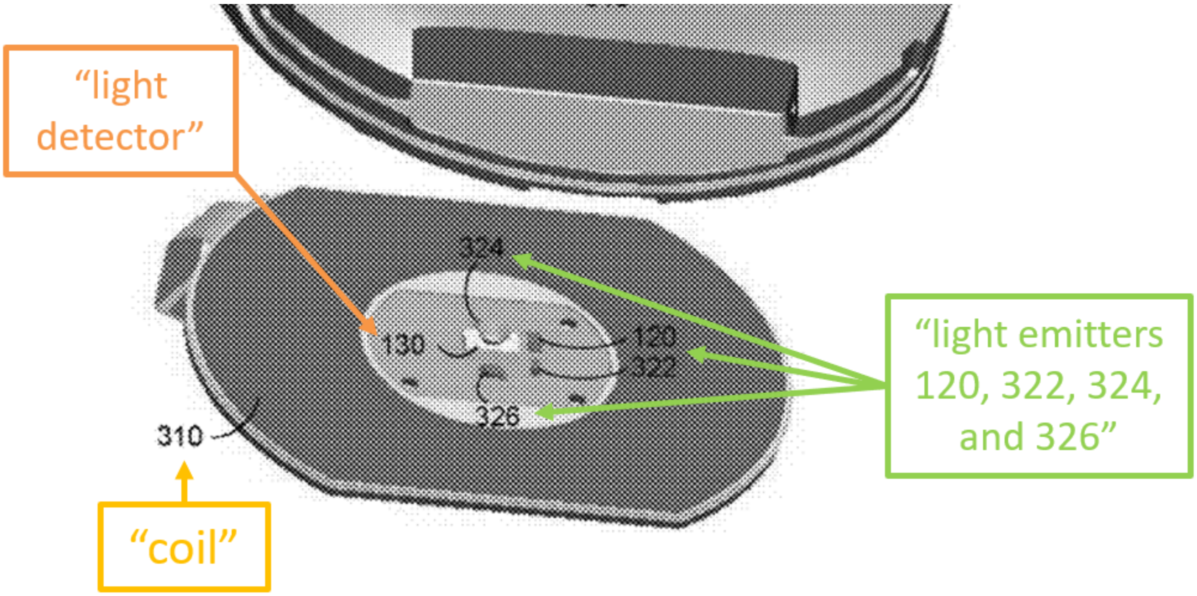
Fraser also teaches that "light transmissive section 145 can transmit light reflected from a user to the light detector 130 of FIG. 3." *Id*. [0027]. In the figure above, light reflected back is shown with arrow 135. Fraser's "light transmissive sections" can be "etched, molded, drilled, [or] laser cut" into—forming "apertures" in—an opaque lens (*id*. [0018]):



See id. at 5 (Fig. 4). Thus, Fraser also teaches the claimed cover windows for light transmission (emission and reception). EX1003 ¶265.

a. <u>Motivation to Combine Kotanagi, Honda, and Fraser</u>

The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. It would have further been obvious to a POSITA to add Fraser to Kotanagi (as modified by Honda) for various reasons. For example, both teach optical biosensing and contactless / wireless charging. EX1005 ¶53, EX1041 [0026]. Fraser's light emitters are surrounded by a wireless charging coil:



EX1041 at 4 (detail of Fig. 3). Thus, Fraser is analogous to Kotanagi as modified by Honda, and Fraser would have confirmed a POSITA's expectation of success in adding a wireless charging coil to Kotanagi. EX1003 ¶¶266–267.

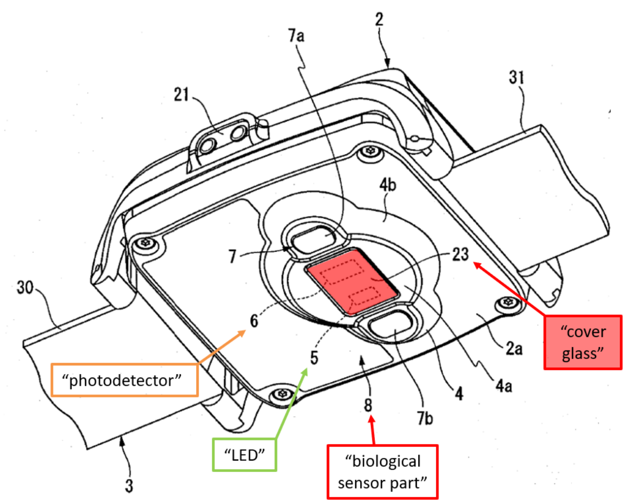
Moreover, Fraser teaches "light transmissive sections to focus emitted and received light." EX1041 [0029]. Because Kotanagi's watch is intended to emit and receive light for the same purpose, a POSITA would have looked to Fraser for how to focus or guide the light and would have modified Kotanagi's structure (e.g., to surround light transmissive sections with opaque sections) with a reasonable expectation of success. EX1003 ¶268.

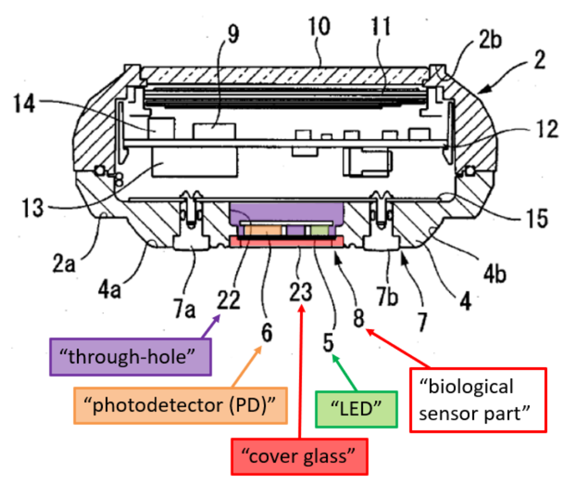
These motivations to combine also apply to the other Ground 3 combinations, shown below. Further motivations to combine are provided throughout this petition and Dr. Duckworth's declaration. EX1003 ¶269.

2. Dependent Claim 15

Claim 15 depends from Claim 14 and adds: **"wherein: the biosensor module includes an array of optical components; and the cover defines an array of windows, each window of the array of windows aligned with a respective optical component of the array of optical components."**

As explained above for Claim 8, Kotanagi's LED and photodetector are positioned immediately behind its the cover glass for operational access:



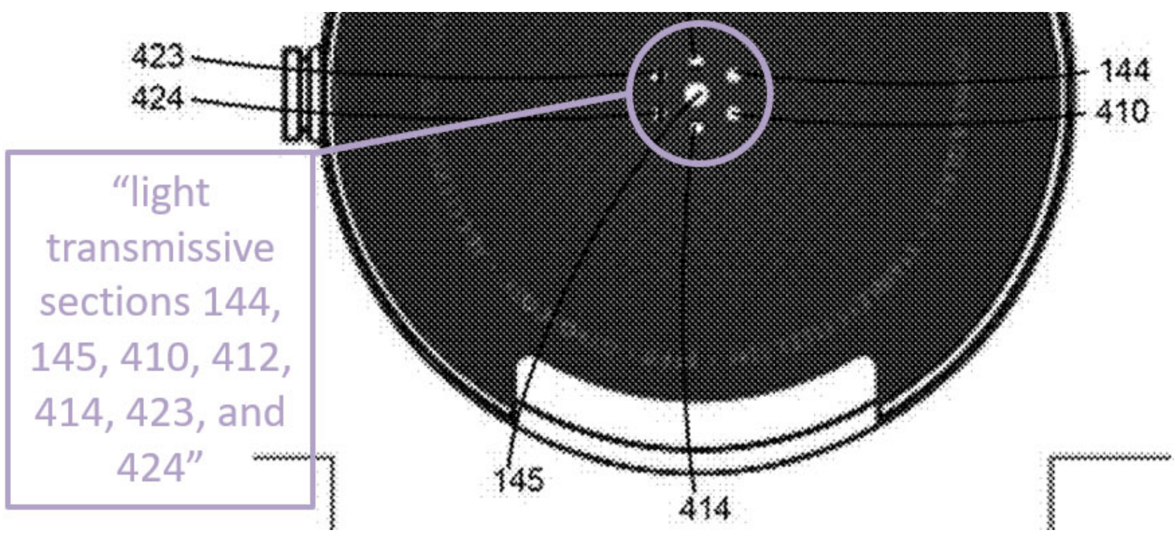


See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶271.

Kotanagi's LED and PD teach the claimed "array of optical components." Because Kotanagi's cover glass provides sufficient space for simultaneous optical access to both components (see the separate dashed outlines on cover glass 23 in Fig. 5 above), Kotanagi teaches an array of windows "aligned with" respective optical components in the array. Even if this claim is interpreted to require separate and individual windows, at a minimum, the two areas surrounded by

dashed lines in Kotanagi's Figure 5 would have suggested to a POSITA to provide windows in those aligned positions. Kotanagi's larger window is functionally equivalent to the claimed two windows, because it is large enough to accommodate both the transmission and reception of light to the two optical components; creation of two smaller windows instead of one larger one would create no new and unexpected result.[13] EX1003 ¶272.

Moreover, Fraser teaches an array of "light transmissive sections" that can be "etched, molded, drilled, [or] laser cut" into—forming separate windows in—an opaque lens. EX1041 [0016], [0027], [0018].



See EX1041 at 5 (detail of Fig. 4). EX1003 ¶273.

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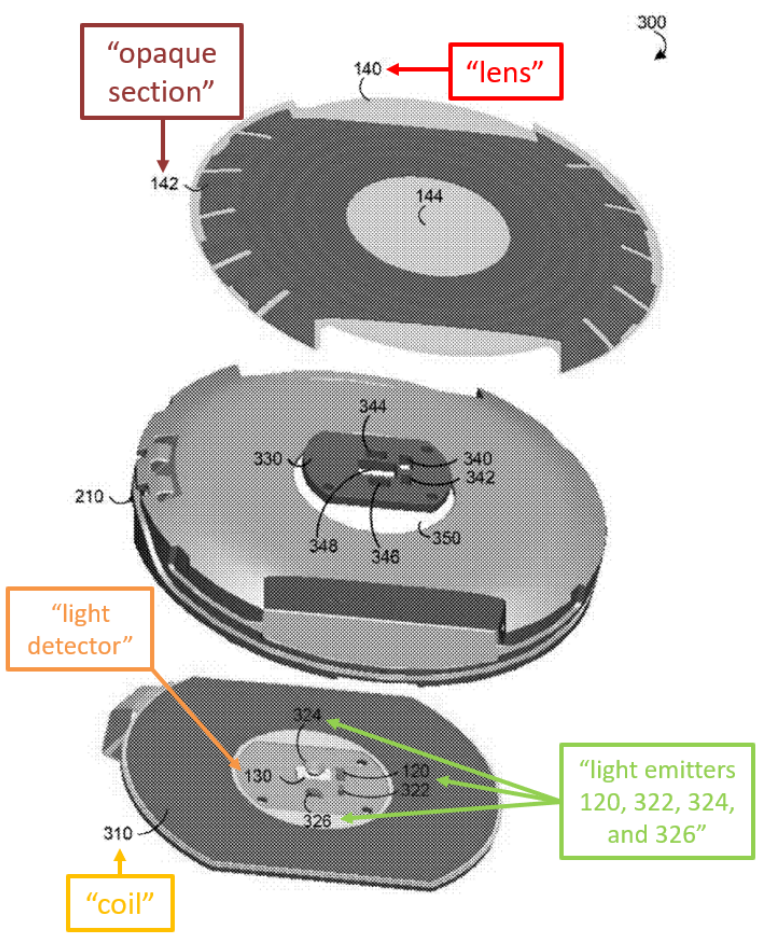
[13] *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), *see supra* note 12.

Fraser specifies that its windows are both separated from each other and aligned with optical components:

> [t]he light transmissive sections 144, 145, 410, 412, 414, 423, and 424 can be separate and distinct from each other in the opaque section 142. The light transmissive sections 144, 410, 412, 414, 423, and 424 can transmit light from the light emitters 120, 322, 324, 326 of FIG.3 and other light emitters.

EX1041 [0027].



See EX1041 at 4. Thus, Fraser teaches a biosensor module with an array of windows aligned with an array of optical components, as claimed. EX1003 ¶274–275.

D. Ground 4: Claim 9 is unpatentable because it would have been obvious over Kotanagi and Honda and further in view of Orr.

1. Dependent Claim 9

Claim 9 depends from Claim 7 and adds: "**wherein: the biosensor module comprises: at least one light source; and a set of detectors; and the at least one light source and the set of detectors are configured to operate as a photoplethysmogram (PPG) sensor**."

Kotanagi teaches a biological sensor with an LED, photodetector, and two electrodes (contact detection means 7) for detecting skin contact:

> A biological sensor part 8, which includes an LED (Light Emitting Diode) (light-emitting part) 5 for emitting light toward the living body while in contact with the living body surface B side, a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body out of the light emitted by the LED 5 and generating a pulse signal (biological information signal) corresponding to the amount of received light, and a contact detection means 7 for detecting whether the LED 5 and the PD 6 are in contact with the living body surface B, is disposed on the lower surface 4a of the protruding part 4.

EX1005 ¶46. Together, these features operate as a PPG sensor—a device that uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. *See* EX1041 [0016] ("light detector 130 [] can detect light 135 reflected from the wrist of the user" for "photoplethysmography."). EX1003 ¶277.

Specifically, Kotanagi teaches optically measuring the pulsation of arteries in the wrist:

> The PD 6 . . . generates a pulse signal (biological information signal) corresponding to the amount of received light, and outputs the signal to the data processing part 9. That is, since the amount of reflected light out of the light emitted from the LED 5 varies depending on fluctuations in blood flow within arteries and arterioles in the wrist A (living body), the PD 6 can receive reflected light corresponding to the pulsation of arteries - that is, pulse waves. As a result, the PD 6 can generate a pulse signal.

EX1005 ¶(0065).[14] EX1003 ¶279.

Thus, Kotanagi teaches a photoplethysmogram (PPG) sensor comprising a light source and a set of detectors (a photodetector and two contact detection

[14] Kotanagi is not required to use the word "photoplethysmogram" to read on this limitation. *See In re Bond,* 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

means) for performing a PPG measurement, as Kotanagi teaches optical measurement occurs upon contact detection. EX1005 ¶59. If the claim is interpreted as requiring two different photodetectors, such a configuration would have been obvious as a mere duplication of parts, as shown with respect to Orr below.[15] EX1003 ¶280.

Based on the above, Claim 9 would have been obvious in view of Kotanagi and Honda. Moreover, Claim 9 would have been obvious in view of Kotanagi, Honda, and Orr. EX1003 ¶281.

Orr, which was published in 1979, teaches a "light emitting diode 1 and [] photodiodes 3 disposed on the rear surface of a wristwatch casing 6." EX1025 3:34–35. Orr explains that a photodiode is a "semiconductor detector for detecting variations in the light reflected from the skin." *Id.* 1:42–45, 6:19–21. Orr's LED is surrounded by "opaque plastics material 2" and the whole back surface is set in "transparent plastics material 4." EX1025 2:17–22. Orr's multiple photodiodes are shown here:

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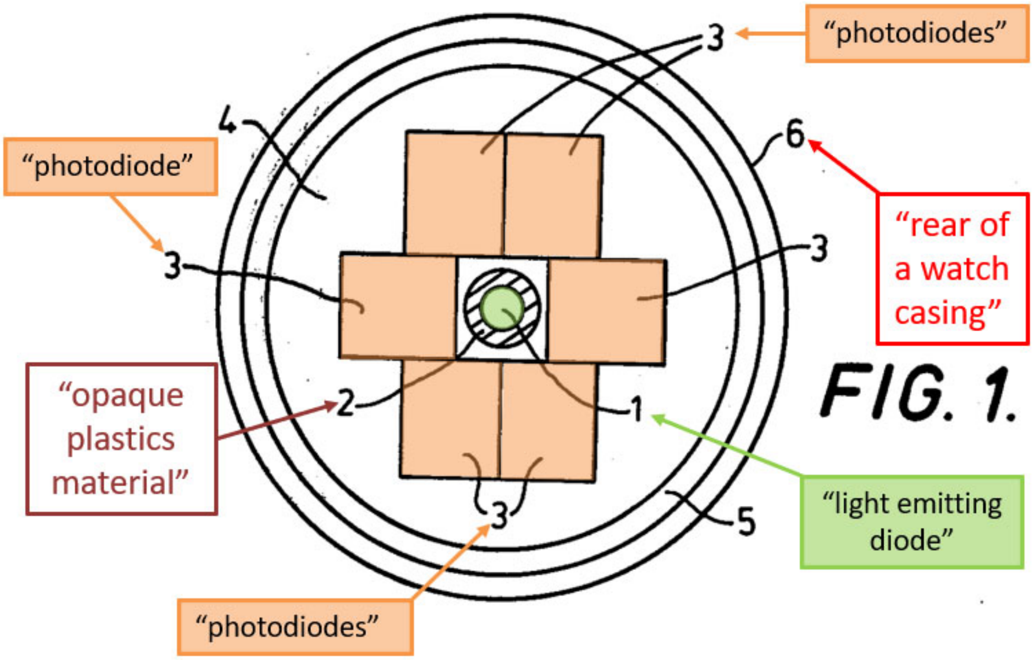
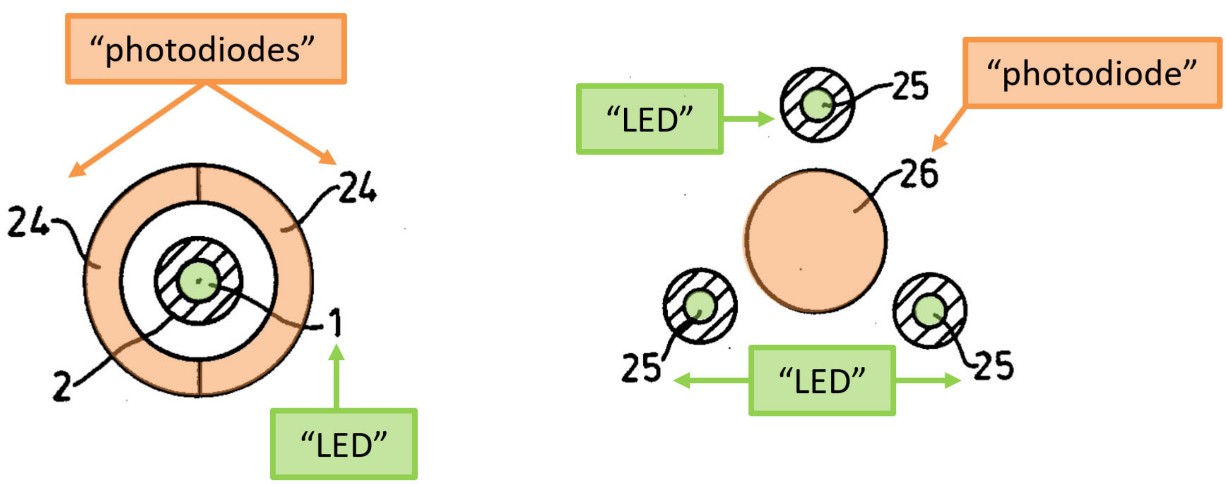
[15] *See In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) *see supra* note 12.



See EX1025 at 2. Thus, Orr teaches a light source and set of multiple optical detectors operating as a PPG sensor. Orr's Figures 4 and 5 show alternative arrangements:



See EX1022 at 3. It would have been a simple matter to combine Kotanagi and Orr because there is room within Kotanagi's cover glass 23 for an additional

detector, leading a POSITA to expect success when comining them. EX1003 ¶¶282–283.

Therefore, a POSITA would have found the arrangement and number of photodiodes on the back side of a biosensing wristwatch obvious in view of Orr. EX1003 ¶284.

As stated above, a photoplethysmogram (PPG) uses a light source and a photodetector at the surface of skin to measure the volumetric variations of blood circulation. Thus, Kotanagi and Orr teach a PPG measurement. *See* EX1003 ¶285.

a. Motivation to Combine Kotanagi, Honda, and Orr

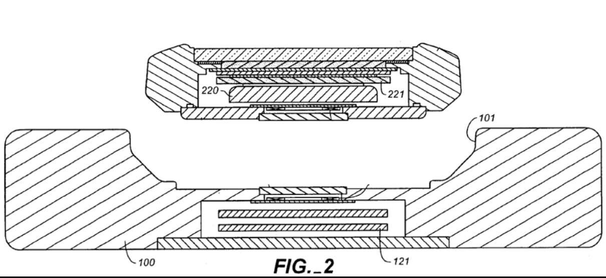
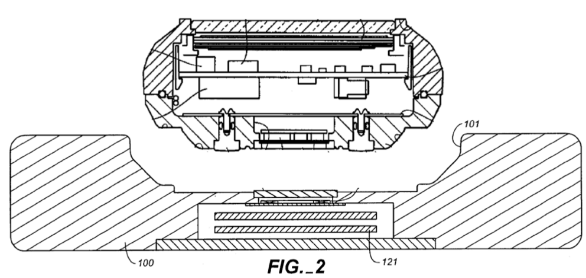
The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. It would have further been obvious to a POSITA to add Orr for various reasons. For example, Orr teaches that multiple detectors can work together to provide higher current output (EX1025 3:22–25) and can help capture signals reflecting in unknown or multiple directions (*see id*. 2:19–21, 3:31–32). Moreover, additional detectors can provide a failsafe and backup function in case a single detector stops working. EX1003 ¶286.

E. Ground 5: Claim 12 and 18 are unpatentable because they would have been obvious over Kotanagi in view of Honda and further in view of Park.

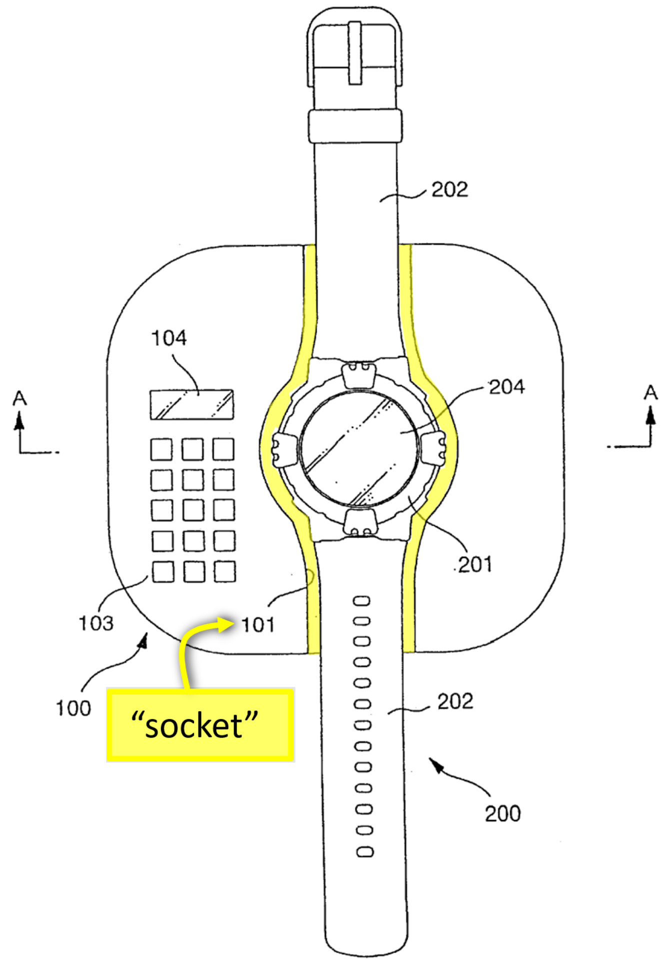
1. Dependent Claim 12

Claim 12 depends from Claim 7 and adds: "**wherein: the wearable electronic device further comprises a first magnet positioned within the housing and below the cover; the external wireless charging device comprises a second magnet; and the first and second magnets are configured to maintain alignment between the wearable electronic device and the external wireless charging device during a charging operation**."

Because the Kotanagi and Honda watch devices are so similar, Kotanagi's device as modified by Honda (to include a wireless charging receive coil) would fit within (and interact similarly with) at least a scaled version of Honda's charging station.

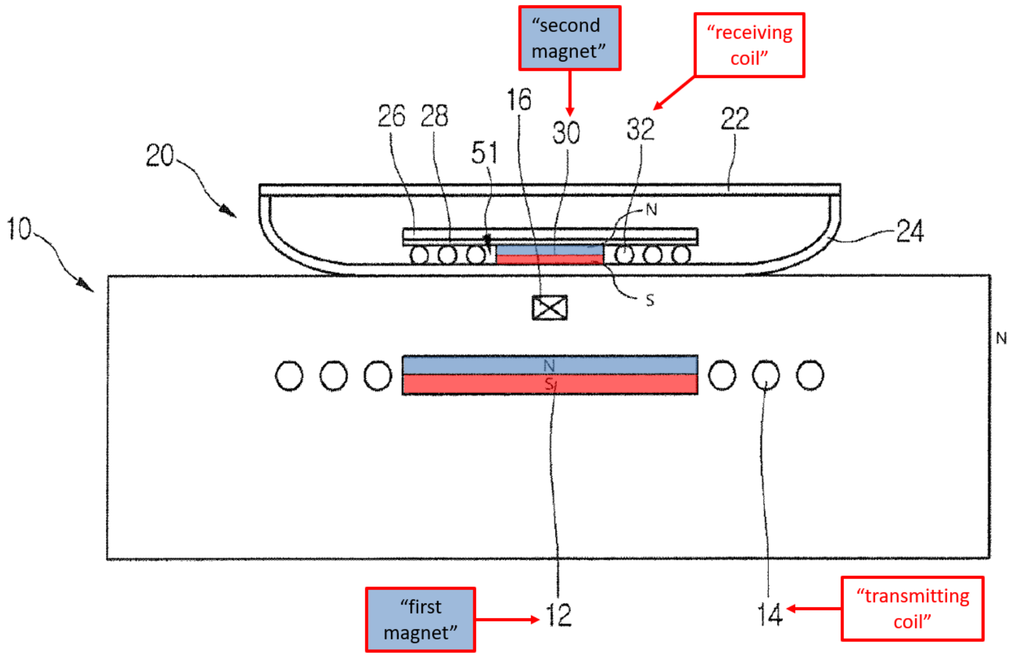
Honda's watch, with Honda's station (*see* EX1006 at 3):	Kotanagi's watch, with Honda's station (*see* EX1006 at 3, EX1005 at 27):
	

Honda facilitates alignment of its wireless charging coils via a socket. EX1006 at 2 (Fig. 1). However, even this socket may not achieve Honda's preferred positioning of wireless charging coils within at least 1 mm of alignment with each other: "Placing the two coils into alignment by simply seating the portable electronic apparatus into the station is difficult because the positions of the coils attached in the station and the



portable electronic apparatus are required to be accurate." EX1006 at 2 (Fig.1); 1:53–56; . EX1003 ¶¶288–289.

Honda's teaching of this difficulty would have motivated a POSITA to look for additional ways to align for charging. Park teaches wireless charging alignment via a first magnet in a wireless charging station and a second magnet within the housing of an electronic device, as illustrated below:



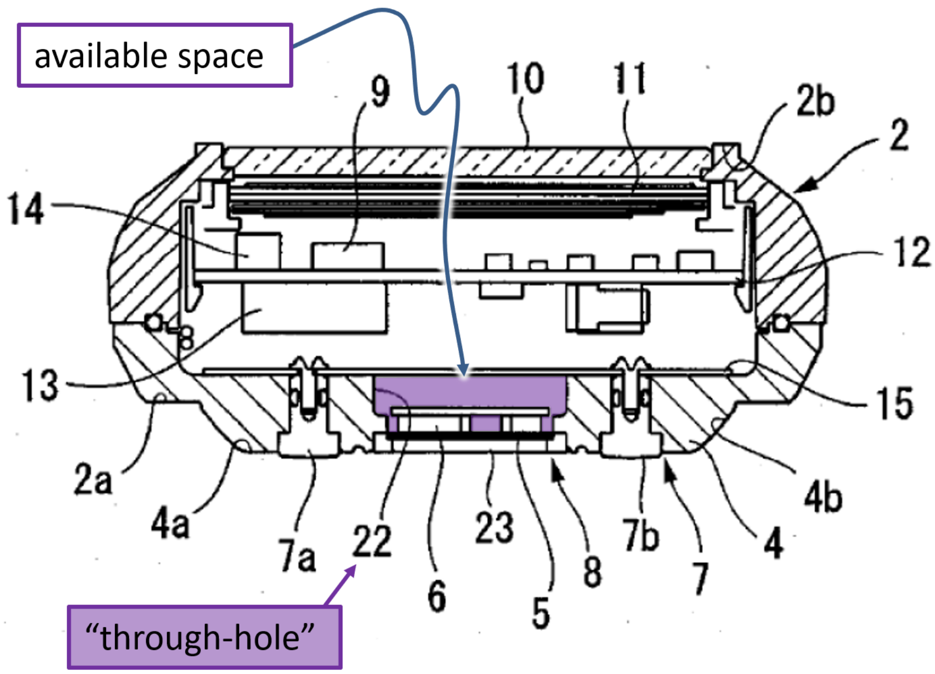
See EX1015 at 64; EX1012 at 11. Park teaches that these magnets reduce the distance between the transmitting coil and the receiving coil, thus "improving wireless power transfer efficiency." EX1015 at 44; EX1012 [0192]. A POSITA would have used Park's teachings of magnetic alignment to insert magnets into the modified watch device of Kotanagi and the charging station of Honda (e.g., using Honda's socket for gross alignment and Park's magnets for fine or final alignment). Thus, a POSITA would have found the limitations of Claim 12 obvious in view of Kotanagi, Honda, and Park. EX1003 ¶¶290–291.

a. <u>Motivation to Combine Kotanagi, Honda, and Park</u>

The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. Kotanagi and Honda were both assigned to Seiko companies. *See* EX1005 at 1, EX1006 at 1. Thus, a

POSITA having Kotanagi would have also had access to Honda and readily combined teachings from the two references. EX1003 ¶292.

A POSITA would have been further motivated before the effective filing date to combine the teachings of Honda and Park as they both teach the need for alignment in wireless charging. Honda provides alignment via a socket/recess, but acknowledges that fully accurate alignment is "difficult" to achieve. EX1006 1:53–59. Park provides alignment via permanent magnets. EX1006 at 2; EX1015 at 42–43; EX1012 at 11. Given the similarity of the Honda and Park charging stations (e.g., both designed to use inductive coupling from coils in the station and device), and given the known properties of permanent magnets, inserting permanent magnets into station and device would have merely combined familiar elements according to known methods to yield predictable results. *See KSR*, 550 U.S. at 419. Moreover, the available space in Kotanagi's device could fit, or readily be adjusted to fit, both a charging receive coil (Honda and Park) and a permanent magnet (Park). This indicates a POSITA would have expected the combination would be successful.



See EX1005 at 27 (Fig. 7). EX1003 ¶293.

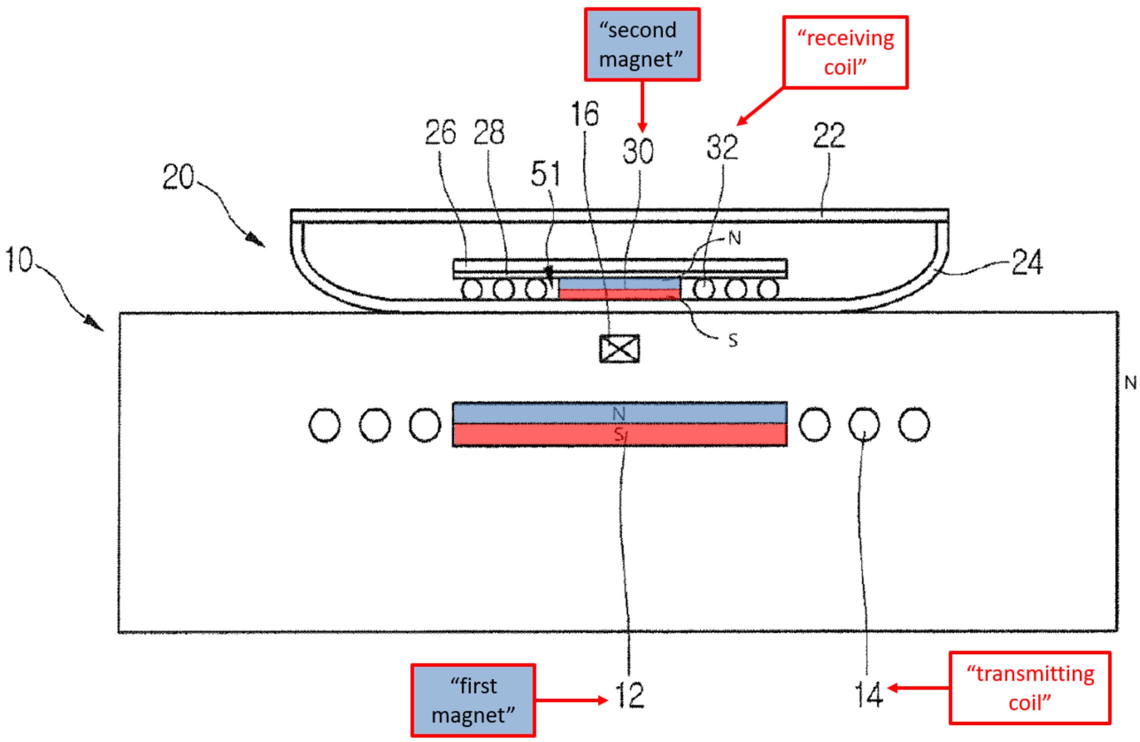
This motivation to combine also applies to other claims rejected under this ground (Ground 5), and Ground 6 (discussed below).

2. Dependent Claim 18

Claim 18 depends from Claim 14 and adds: "**wherein: the electronic device further comprises a magnet that is configured to magnetically couple the electronic device to an external inductive power transmitter dock through the cover.**"

The analysis for Claim 12 also applies here (where the "wireless charging device" of Claim 12 is analogous to the "inductive power transmitter dock" of Claim 18). To summarize, both Honda's charging station and Park's docking station cradle teach the claimed "external inductive power transmitter dock."

Honda teaches that with its socket approach, "[s]ince the station-side coil 110 and the watch-side coil 210 face each other as shown in FIG. 2 and FIG. 3, both coils are electromagnetically coupled." EX1006 9:41–43. Park teaches a permanent magnet that magnetically couples to a docking station cradle through the back side of an electronic device:



See EX1015 at 64; EX1012 at 11. Park further explains that when the first magnet and second magnet are close enough, a change in the flux density is sensed, indicating that the magnets are "coupled" to each other. EX1012 [0191]–[0192]; EX1015 at 44. EX1003 ¶296.

Thus, as explained with respect to Claim 12, a POSITA would have found it obvious to incorporate permanent magnets to align the device for magnetic

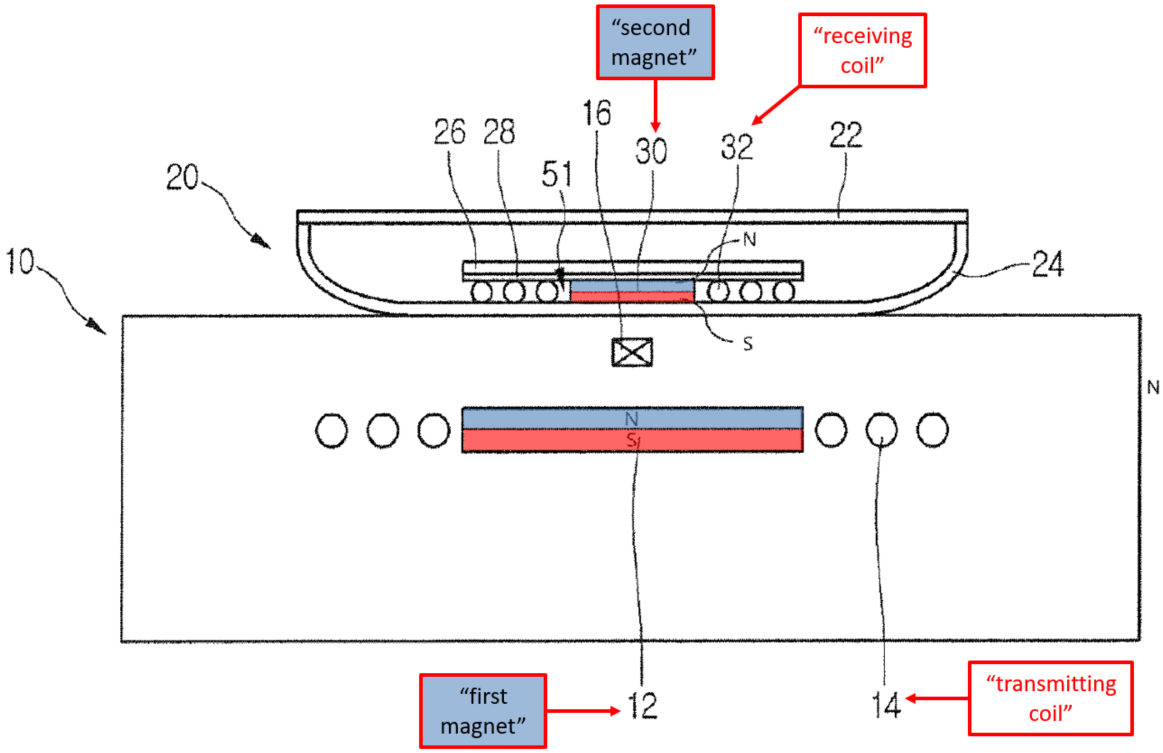
coupling and wireless charging through the cover. Honda teaches that electromagnetic fields are felt most strongly through a non-conductive material (EX1006 13:33–63, Fig. 15), such as through the glass cover of Kotanagi's biosensor module. Honda has a similar cover glass that allows coupling and charging. Park also allows charging through the cover of its device. Thus, a POSITA would have found the limitations of Claim 18 obvious in view of these references. EX1003 ¶297.

F. <u>Ground 6: Claim 4 is unpatentable because it would have been obvious over Kotanagi in view of Honda and Choi and further in view of Park.</u>

1. <u>Dependent Claim 4</u>

Claim 4 depends from claim 1 and further adds **"wherein: the electronic watch further comprises a first magnet positioned within the housing; the first magnet is configured to couple to a second magnet positioned within a charging dock; and the first and second magnets are configured to maintain alignment of the electronic watch with respect to the charging dock."**

The analyses of Claims 12 and 18 also apply here. For example, Honda uses a socket for at least gross alignment (EX1006 at 2, Fig. 1), but acknowledges difficulty, suggesting a need for more precision (EX1006 1:53–54). Park teaches an electronic device comprising a first magnet and second magnet in a dock for more precise alignment during charging:



See EX1015 at 64; EX1012 at 11. It would have been obvious to a POSITA to combine the teachings of Kotanagi with Honda and Park for at least the reasons stated above with regard to Claims 12 and 18. EX1003 ¶¶299–301.

a. <u>Motivation to Combine Kotanagi, Honda, Choi, and Park</u>

It would have been obvious to a POSITA to combine Kotanagi, Honda, Choi, and Park for various reasons. The reasons to combine Kotanagi and Honda provided elsewhere in this petition (e.g., *supra* § IV(A)(1)(h)) also apply here. Similarly, the reasons to add Choi (e.g., *supra* § IV(B)(1)(k)) and to add Park (e.g., *supra* § IV(E)(1)(a)) also apply here. To summarize, Kotanagi teaches wireless charging and has space for Honda's wireless receive coil and Park's alignment

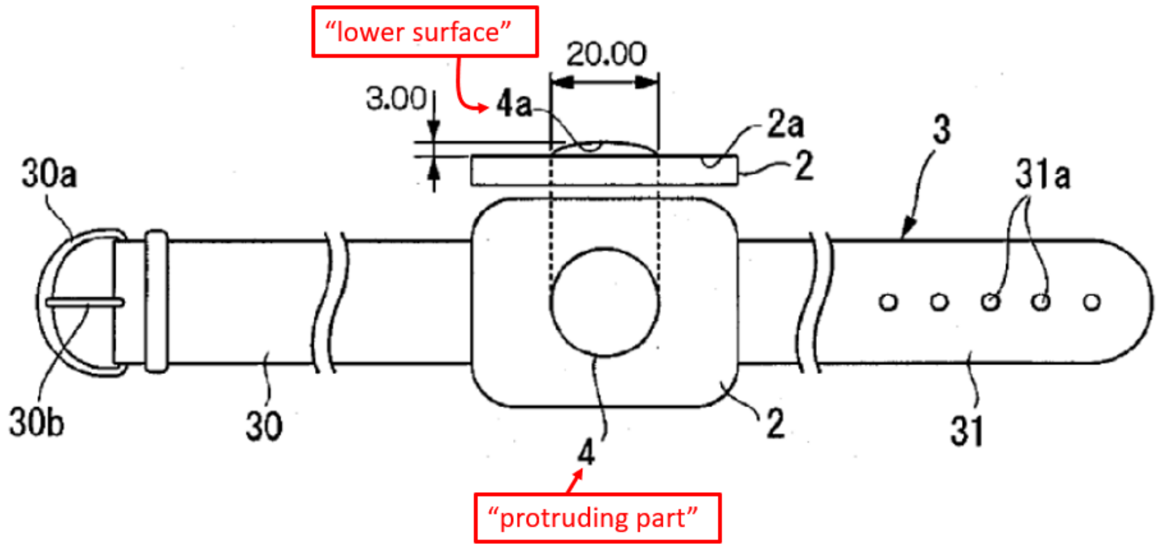
magnet. Kotanagi's display and electrodes indicate a likelihood of success when adding Choi's touch-sensitive display and ECG electrode function. For these and the reasons explained elsewhere herein, a POSITA would have found the limitations of Claim 4 obvious in view of these references. EX1003 ¶301.

G. Ground 7: Claims 10 and 19 are unpatentable because they would have been obvious over Kotanagi and Honda, and further in view of Jabori.

1. Dependent Claim 10

Claim 10 depends from Claim 7 and further adds **"wherein: the cover protrudes outward from a rear surface of the housing; the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of the external wireless charging device."**

The analysis provided above for Claim 2 shows that Kotanagi teaches a cover protruding outward from the rear of the housing. Kotanagi teaches this can form a convex exterior profile: "Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10." EX1005 ¶(0080).



See EX1006 at 28 (Fig. 8). A POSITA would have understood from Kotanagi's Figure 10 that the entire protruding part can form a convex "cover glass" that spans the through-hole 22. *Id.* at 28. As noted above, Kotanagi also teaches wireless charging, or charging "in a contactless state" (EX1005 ¶(0053)). This would have motivated a POSITA to look to Honda for modifications to make for such wireless charging. EX1003 ¶¶303–304.

Honda teaches an external inductive power transmitter dock which it terms a "station" having a "socket" to facilitate alignment. EX1006 at 2 (Fig. 1). Honda also teaches using complementary shapes, with a "slightly larger" socket shape to assist with alignment for charging:

> [In] FIG. 1 . . . . an electronic watch 200 is seated in a socket 101 of a station 100 . . . . Since the socket 101 is shaped to be slightly larger than a body 201 of and a band 202 of the electronic watch 200, the watch body 201 is seated in alignment in the station 100.

EX1006 6:4–11. EX1003 ¶305.

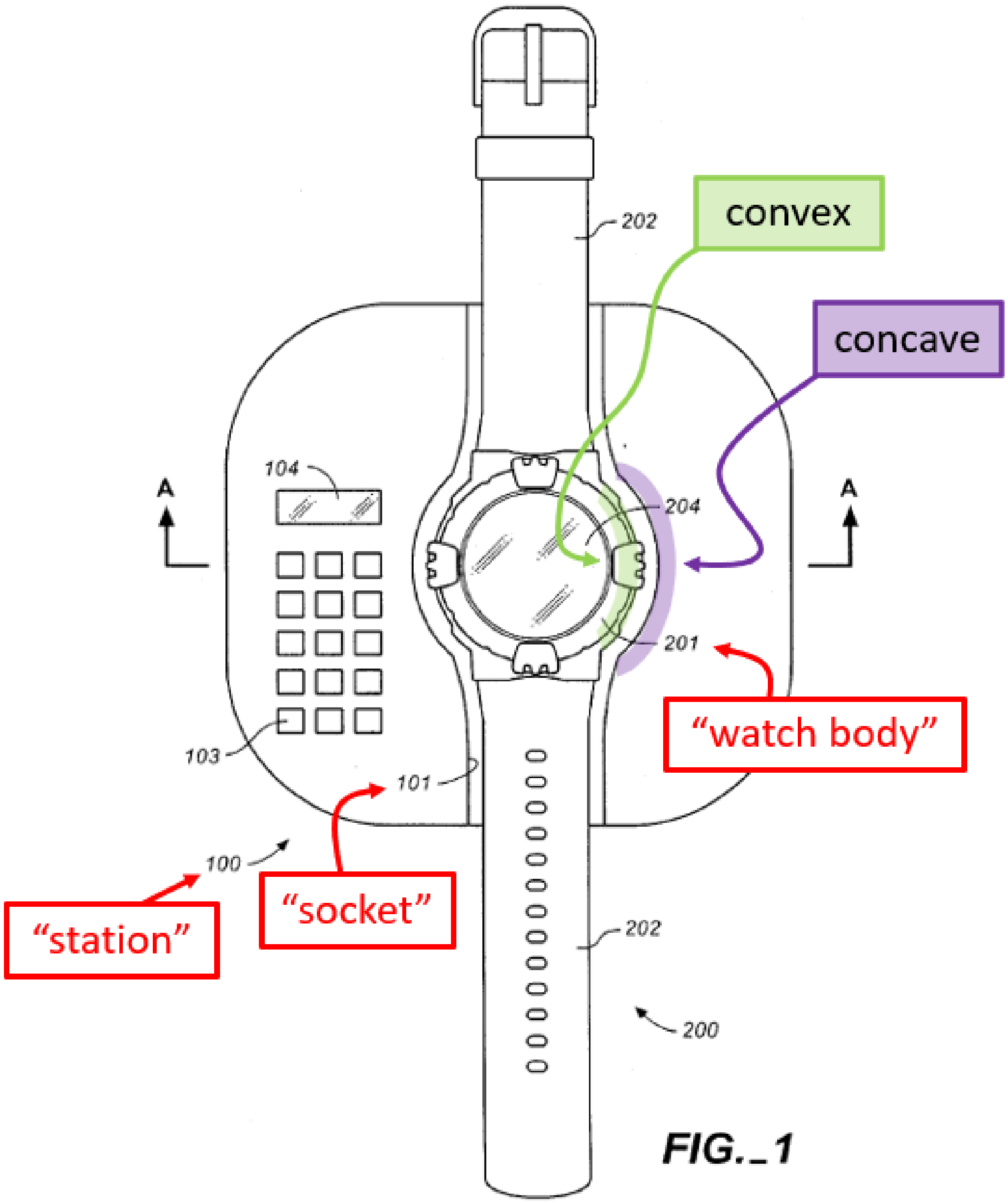


FIG._1

See Id. at 2 (Fig. 1). Similar to the complementary concavity shown above, Honda's cross section view shows complementary convex and concave surfaces to facilitate alignment in a charging station:

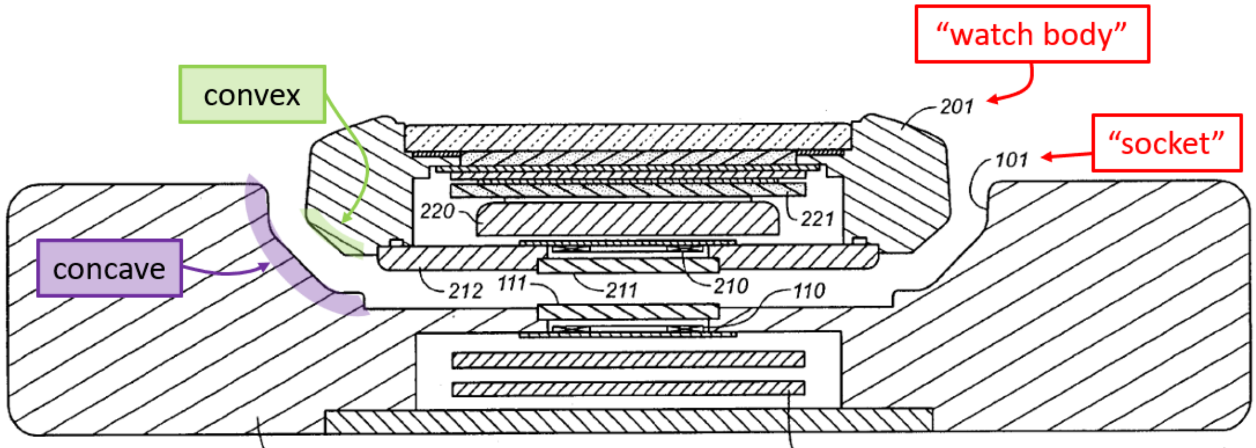
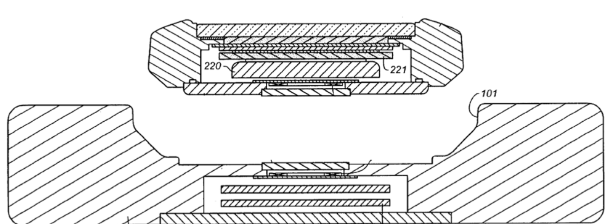
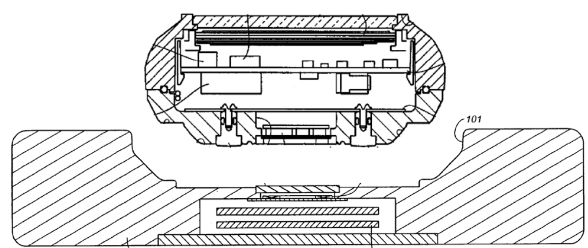


FIG._2

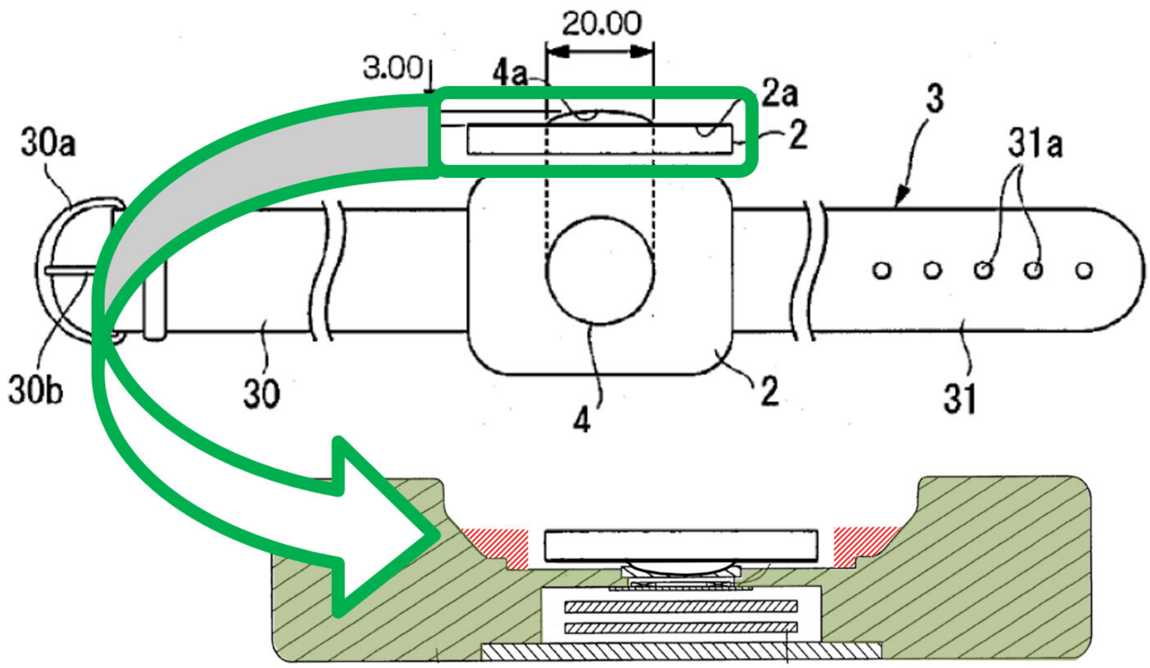
See id. at 3 (Fig. 2). EX1003 ¶306.

Honda's socket can already accommodate the shape of some Kotanagi embodiments quite well:

Honda's watch, with Honda's station (*see* EX1006 at 3):	Kotanagi's watch, with Honda's station (*see* EX1006 at 3, EX1005 at 27):
 FIG._2	 FIG._2

However, a POSITA using Kotanagi's Figure 10 embodiment would have known to make a slight modification to Honda's socket, based on Honda's teachings, to provide a complementary concavity in the charging station, so the

socket can be "shaped to be slightly larger than" the device being charged. EX1006 6:9.



See EX1005 at 28 (Fig. 8), EX1006 at 3 (Fig. 2) (annotation of Kotanagi's watch in a modified version of Honda's station). EX1003 ¶308.

A POSITA would have known from Honda to preferably maintain a distance between transmitter-side and receiver-side coils of approximately 10 mm or less (see Honda's discussion of Fig. 14 showing transmission efficiency as a function of distance—EX1006 13:3–32), and therefore provided a concavity for the convex protrusion if the receive-side coil is located behind it. EX1003 ¶310.

Further, **Jabori** teaches in a similar context that convex / concave shapes promote alignment for wireless power transmission:

> Fig. 4-5 are a computing device and wireless power transmitter according to example implementation. In some examples the enclosure 105 and a docking station 405 may have a **shape that promotes the alignment** caused by the haptic modules to align the wireless power transmitter 455 with the wireless power module 130. One example of such a shape is the computing device enclosure 105 has a **convex** shape and the docking station 405 includes **concave** shape.

EX1017 [0017] (emphasis added).

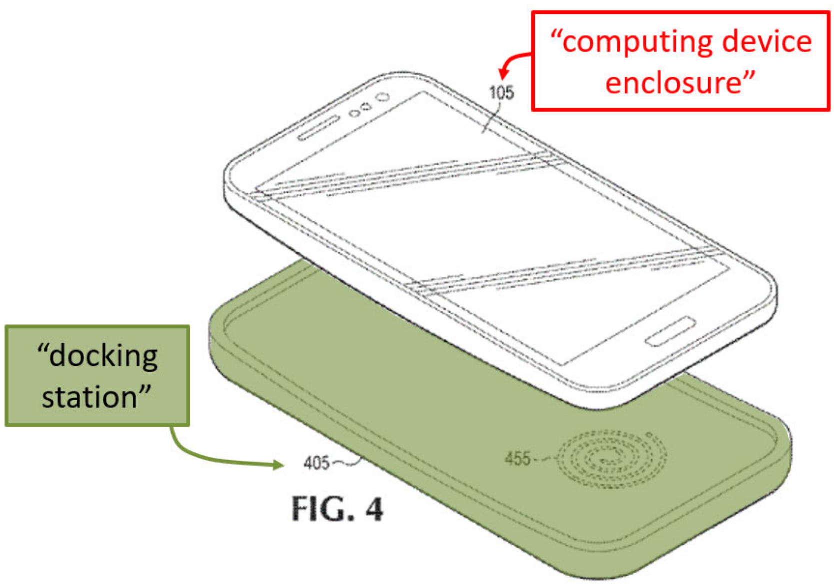


FIG. 4

See EX1017 at 16. In view of these teachings, a POSITA would have found Claim 10 obvious over Kotanagi, Honda, and Jabori. EX1003 ¶311.

a. <u>Motivation to Combine Kotanagi, Honda, and Jabori.</u>

The reasons to combine Kotanagi and Honda provided elsewhere in this petition also apply here. Kotanagi and Honda were both assigned to Seiko

companies. *See* EX1005 at 1, EX1006 at 1. Thus, a POSITA having Kotanagi would have also had access to Honda and readily combined teachings from both. Such a person would have expected success because the devices they teach are so similar: both teach wireless charging and biosensing of a pulse signal. EX1003 ¶313.

A POSITA would have expected success in adding Jabori because it also teaches wireless or contactless charging. Honda teaches that alignment of the wireless charging coils is "required to be accurate" and that misalignment of the wireless charging coils reduces or modifies the magnetic flux of the wireless charging field. EX1006 1:56; *see id*. at 9 (Fig. 10). To achieve such accuracy, a POSITA would have looked to Jabori because it uses a nested approach to more accurately align wireless charging devices, and a POSITA would have found Jabori's teachings on convex/concave as a complementary enhancement to Honda's teachings. EX1003 ¶314.

This motivation applies as well to other claims rejected using Jabori, including under Grounds 7 and 8. Further motivations to combine are provided throughout this petition and Dr. Duckworth's declaration. EX1003 ¶¶315–317.

2. Dependent Claim 19

Claim 19 depends from claim 14 and adds **"wherein the cover protrudes outward from a rear surface of the housing to facilitate alignment between the cover and a mating surface of an external wireless charging device."**

The analysis of Claim 10 applies here to show obviousness over Kotanagi, Honda and Jabori, including the reasons to combine discussed above. Claim 19 does not require a "convex" protrusion, but it is otherwise analogous to Claim 10. EX1003 ¶319.

H. Ground 8: Claim 6 is unpatentable because it would have been obvious over Kotanagi in view of Honda and Choi and further in view of Jabori.

1. Dependent Claim 6

Claim 6 depends from Claim 1 and further adds **"wherein: the cover defines a convex exterior profile; and the convex exterior profile facilitates alignment between the cover and a mating surface of an external wireless charging device."**

The analysis of Claim 10 applies here to show obviousness of these additional limitations over Kotanagi, Honda and Jabori, including the reasons to combine discussed above. The analysis of Claim 1 applies as well. To summarize, Kotanagi teaches many of the claim limitations, Honda teaches a watch biosensing device as well as specific structures for wireless charging, and Choi teaches a

watch biosensing device as well as a touch-sensitive display and using electrodes for ECG measurement. Although Kotanagi's Figure 10 already teaches a convex exterior profile and Honda teaches mating and alignment, Jabori's specific teaching of a convex/concave mating arrangement (EX1017 at [0017] shows that a POSITA would have found Claim 6 obvious in view of these references. EX1003 ¶321.

As discussed with regard to Ground 8, a POSITA would have found obvious a cover with an exterior profile that facilitates alignment with the cover and a mating surface of an external wireless charging device in view of the disclosure in Park and Jabori. EX1003 ¶322.

a. **Motivation to Combine Kotanagi, Honda, Choi, and Jabori**

A POSITA would have been motivated to combine these references for at least the reasons provided under Ground 2 (Claim 1) and 7 (Claims 10 and 19). For example, nothing about the addition of Choi would frustrate the purpose of—or teach away from—the Jabori teachings or modifications discussed above. Although Ground 7 did not include Choi, neither Choi's touch-screen display nor Choi's processing of electrode data for ECG purposes would have been contrary to Jabori's nested (convex/concave) approach to device alignment for wireless charging. EX1003 ¶323.

V. SECONDARY CONSIDERATIONS

Secondary considerations should be considered but do not control an obviousness conclusion, particularly where, as here, a strong *prima facie* showing of obviousness exists. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). Petitioner is unaware of evidence of secondary considerations, and any such evidence could not outweigh the strong *prima facie* case of obviousness. Petitioner reserves the right to respond to any evidence of secondary considerations.

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

With respect to 35 U.S.C. § 314(a), Fintiv factors 2, 3, 4, and 6 strongly favor institution of this IPR, and factors 1 and 5 are neutral. With respect to factor 2, the final written decision in this IPR is expected long before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation five months ago, on October 20, 2022, and the most recent published statistics indicate that the median time to trial for a civil action in the District of Delaware is almost three years. EX1048.

For factor 3, the parties and the court have made little investment in the Delaware Litigation. No infringement or invalidity contentions have been exchanged, claim construction briefing has not started, and initial written discovery is in its early stages.

For factor 4, Petitioner stipulates that, if the Board institutes this IPR, Petitioner will not pursue, in the Delaware Litigation, the specific invalidity grounds for the challenged claims raised in this Petition or that reasonably could have been raised in this Petition. This stipulation "mitigates any concerns of duplicative efforts between the district court and the Board," and, thus, factor 4 "weighs strongly in favor of not exercising discretion to deny institution." *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A).

For factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. For factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of an IPR. For factor 5, Petitioner Masimo is a defendant in the Delaware Litigation. In view of all circumstances, the judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

With respect to Section 325(d), this Petition presents the first *inter partes* challenge to the ’491 patent and none of the references the Petition relies on in the Grounds were considered during examination. Further, the references relied on herein are materially better than the references considered during examination because, as shown above, they disclose every limitation of the independent claims, including wireless charging, a transparent or dielectric or non-conductive cover, electrodes, and other features. Therefore, this Petition presents new prior art and new patentability arguments that have never previously been before the Office.

VII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1–19 of the ’491 patent.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 20, 2023

By: / Philip M. Nelson /

Philip M. Nelson (Reg. No. 62,676)
Jarom D. Kesler (Reg. No. 57,046)
Ted M. Cannon (Reg. No. 55,036)
Customer No. 64,735
Attorneys for Petitioner
Masimo Corporation
(949) 760-0404

CERTIFICATE OF TYPE-VOLUME LIMITATIONS UNDER 37 C.F.R. § 42.24

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,942,491**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 13,594 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a).

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 20, 2023

By: / Philip M. Nelson /

Philip M. Nelson (Reg. No. 62,676)
Customer No. 64,735
Attorney for Petitioner
Masimo Corporation
(949) 760-0404

CERTIFICATE OF SERVICE

I hereby certify that true and correct copies of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,942,491** and **EXHIBITS 1001–1012, 1014–1017, 1020, 1022–1023, 1025–1031, 1033–1039, 1041, 1047–1048** are being served on March 20, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. 10,942,491 as addressed below:

62579 - APPLE INC./BROWNSTEIN
c/o Brownstein Hyatt Farber Schreck, LLP
410 Seventeenth Street
Suite 2200
Denver, CO 80202

Dated: March 20, 2023

/ Philip M. Nelson /
Philip M. Nelson (Reg. No. 62,676)
Customer No. 64,735
Attorney for Petitioner
Masimo Corporation
(949) 760-0404

EXHIBIT 18

On behalf of **Masimo Corporation**
By: Jarom D. Kesler (Reg. No. 57,046)
Ted M. Cannon (Reg. No. 55,036)
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION
Petitioner,

v.

APPLE INC.
Patent Owner.

Case No. IPR2023-00745
U.S. Patent No. 10,076,257

PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 10,076,257

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TABLE OF AUTHORITIES

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OTHER AUTHORITIES

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,076,257 ("the '257 patent")
1002	File history of the '257 patent
1003	Declaration of Alan L. Oslan
1004	*Curriculum Vitae* of Alan L. Oslan
1005	U.S. Pat. Pub. No. 2007/0021677, published January 25, 2007 ("Markel")
1006	U.S. Pat. No. 5,351,695, issued Oct. 4, 1994 ("Mills")
1007	Reserved
1008	Leslie Cromwell et al., Biomedical Instrumentation and Measurements (1973)
1009	Reserved
1010	Reserved
1011	Reserved
1012	US Pat. Pub. No. 2008/015063
1013	US Pat. Pub. No. 2005/0033284
1014	*ABS Plastic Properties*, ADECRO PLASTICS (last visited March 13, 2023), www.adrecoplastics.co.uk/abs-plastic-properties/#:~:text=Finally%2C%20ABS% 20has%20low%20heat,absorb%20shock %20effectively%20and%20reliably
1015	Carl R. Nave, *Conductors and Insulators*, HYPERPHYSICS (last visited March 13, 2023), http://hyperphysics.phy-astr.gsu.edu/hbase/electric/conins.html#c1

Exhibit No.	Description
1016	Merriam-Webster's Collegiate Dictionary (11th ed. 2004)
1017	Random House Unabridged Dictionary (2nd ed. 1993)
1018	The American Heritage Dictionary of the English Language (4th ed. 2000)
1019	Steven M. Kaplan, Wiley Electrical and Electronics Engineering Dictionary (2004)
1020	Stedman's Medical Dictionary (28th ed. 2006)
1021	District of Delaware Time to Trial Statistics – Sept. 2022

GROUNDS LISTING

GROUND 1	Claims 1-4, 8, 10, 11 and 14 are unpatentable as anticipated by Mills
GROUND 2	Claims 1-4 and 8-22 are unpatentable as obvious over Markel in view of Mills

Masimo Corporation ("Petitioner") requests *inter partes* review of Claims 1-4 and 8-22 of U.S. Patent No. 10,076,257 ("the '257 patent").

I. MANDATORY NOTICES; FEES; STANDING

A. Mandatory Notices

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is a real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the '257 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN ("the Delaware Litigation").

3. Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	**Back-up Counsel**
Jarom Kesler (Reg. No. 57,046) 2jzk@knobbe.com BoxCDMI@knobbe.com <u>Postal and Hand-Delivery Address</u>: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson, & Bear, LLP 2tmc@knobbe.com <u>Postal and Hand-Delivery Address:</u> Same as lead counsel Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson, & Bear, LLP 2pmn@knobbe.com <u>Postal and Hand-Delivery Address:</u> Same as lead counsel

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 20,995 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to MasimoIPR-257@knobbe.com.

B. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

C. Grounds for Standing

Petitioner certifies that the ’257 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

II. BACKGROUND

A. Reliance on Expert Analysis and Testimony

The predominant issues in this Petition, as in most patentability challenges, are technical issues for which expert analysis is relevant, particularly with respect to what would have been known or understood by a person of ordinary skill in the art

("POSITA"). Accordingly, this Petition largely adopts the expert analysis and testimony of Mr. Alan L. Oslan EX1003 ¶¶ 1-135; EX1004.[1]

B. Overview of the '257 Patent

The '257 patent is directed to an electronic device, such as a mobile phone, that includes "a heart sensor having several leads for detecting a user's cardiac signals." EX1001, Abstract. Fig. 3 (reproduced below)[2] depicts a mobile phone 300 including a bezel 310, leads 322, 324 and embedded lead 326. EX1003, ¶39.

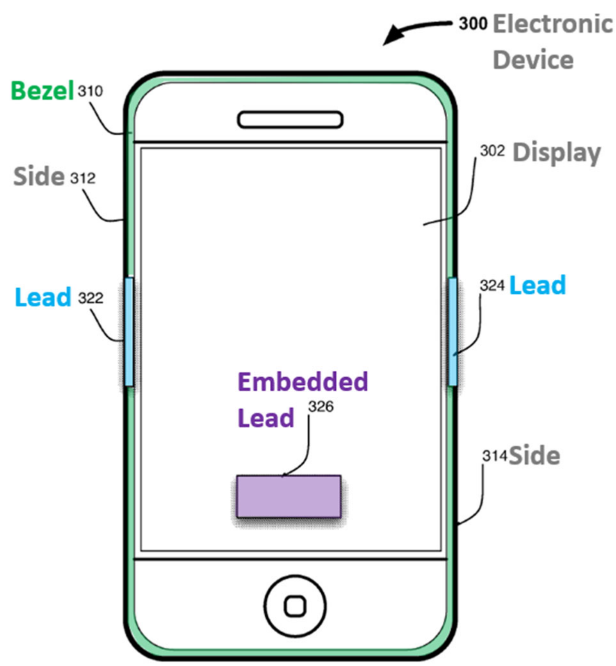


FIG. 3

[1] In general, herein, a single citation to Mr. Oslan expert declaration is provided at the end of each paragraph that is supported by Mr. Oslan's testimony.

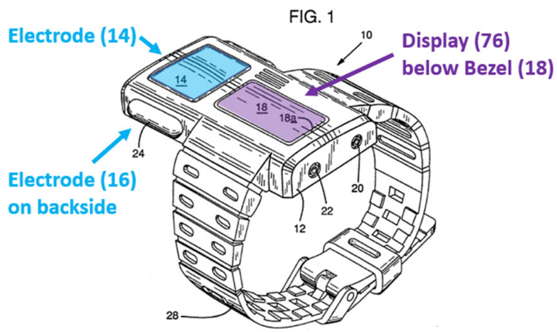
[2] All reproduced figures herein are annotated unless otherwise stated.

The '257 patent admits electronic devices incorporating leads for detecting cardiac signals are not innovative. The '257 patent explains existing electronic devices can detect a user's cardiac signals by providing "at least two leads that the user contacts." EX1001 at 1:57-58. Instead, the '257 patent alleges novelty in the improvement of the ***aesthetic qualities*** of the electronic device with respect to the positioning of the leads. As stated in the background section, the approach of prior art devices placing "the leads … on the exterior surface" of the housing (or enclosure) of the electronic device "is not aesthetically pleasing." *Id*. at 1:58-63. EX1003, ¶40.

By their own admission, the inventors of the '257 patent did not invent a heart sensor having leads for detecting a user's cardiac signals nor incorporation of a heart sensor into an electronic device. EX1001 at 1:57-58. They did not invent incorporation of a heart sensor into an electronic device. *Id*. Rather, the inventors merely expressed an opinion that embedding the leads in an enclosure allegedly results in aesthetically pleasing qualities. *Id*. at 1:58-63; EX1003, ¶40. Such embedding, however, is also not inventive. As evidenced herein, multiple prior art references recognized and expressly teach concealing leads by embedding them into an enclosure of an electronic device.

For example, both prior art references Mills and Markel disclose embedded ECG leads in electronic devices with aesthetic considerations:

Mills



Markel

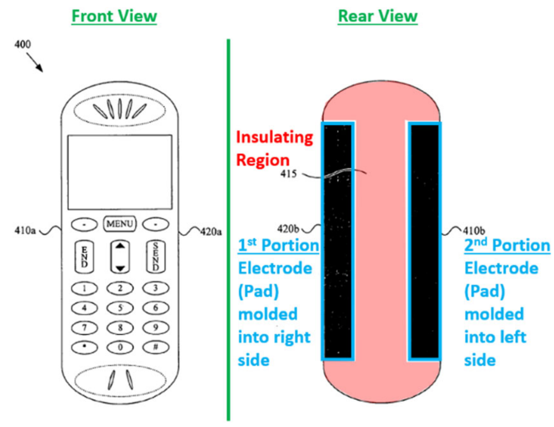


Figure 4

Mills teaches electrodes 14 and 16 are formed as an "integral part" of housing 12. EX1006, 3:47-51. Mills provides a metal-plating composition to its electrodes for "aesthetic reasons." *Id.*, 5:37-40. Similarly, Markel teaches electrodes that are "integrated into various molded components" of the device and "substantially concealed (or hidden) from a user … with little or no visible indication of the electrode presence." EX1005, [0040].

C. Prosecution History of the '257 Patent

The examiner rejected the claims several times before allowing them after Patent Owner made several narrowing amendments to the independent claims. Specifically, Patent Owner added the limitation of an embedded "pad" to claim 1 and the limitation of an electrode embedded in a "display" for Claim 15. EX1002, p77, 80. However, the applicant did not submit, and the examiner did not consider,

any of the prior art references that Petitioner relies on in this Petition. *See generally* EX1002.

D. Priority of the '257 Patent

The '257 patent is a continuation of U.S. App. No. 12/358,905, filed January 23, 2009 (now U.S. Pat. No. 8,615,290), which in turn claims priority to U.S. Prov. App. No. 61/111,498, filed November 5, 2008. Thus, its earliest possible priority date is November 5, 2008. EX1001, cover.

E. Level of Ordinary Skill in the Art

A POSITA of the '257 patent would have at least a B.S. degree in electrical or biomedical engineering or a related field, with at least two years of experience designing patient monitoring or similar systems. A higher level of education may compensate for less work experience and vice versa. EX1003, ¶38.

F. Claim Construction

1. Embedded

Independent Claim 1 recites "embedded" first and second pads of respective first and second leads. Dependent Claim 9 recites a third lead "embedded" with a display. Independent Claim 15 recites "embedded" first and second leads. The '257 patent does not provide a definition of "embedded."

The '275 patent discloses two examples of leads 422, 472 "embedded" into portions of the housing or enclosure 410, 460. EX1001 at 9:19-20, 22-24. Fig. 4A

shows embedded lead 422 "along the outer surface of the bezel 410" and "exposed to the user during use." *Id.* at 9:22-24. In contrast, Fig. 4B shows embedded lead 472 "positioned against the back surface of the bezel 460" *Id.* at 9:34-45. EX1003, ¶44.

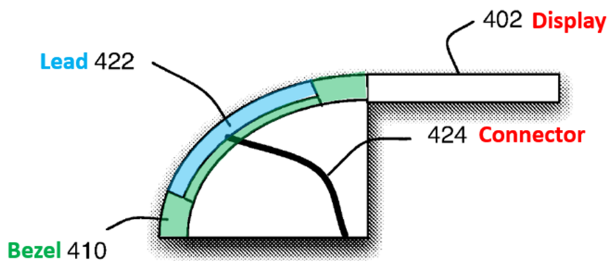


FIG. 4A

"[A] bezel with an embedded heart sensor lead" Ex. 1001 at 9:19-20.

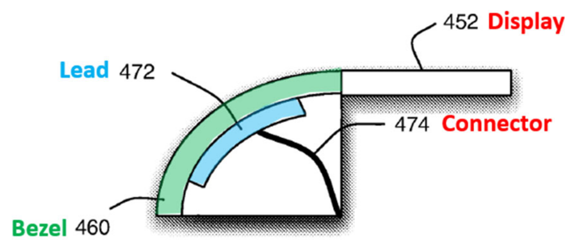


FIG. 4B

"[A]another ... bezel with an embedded heart sensor lead" Ex. 1001 at 9:37-38.

The '257 patent also explains that a lead can be embedded if it is "placed within the thickness of bezel . . . but underneath the outer surface of the bezel." EX1001, 9:45-48, EX1003, ¶44.

Appropriate dictionary definitions of embedded as used in the '257 patent include "to make something an integral part of" (EX1016, 406); "to be or become fixed or incorporated, as into a surrounding mass" (EX1017, 635); "to cause to be an integral part of a surrounding whole" (EX1018, 583). EX1003, ¶45.

A POSITA would understand at the time of the '257 patent disclosure based on its usage in the specification, the claim term "embedded" means "*an integral part of*" such as, by "*being placed in the thickness of a surrounding material including*

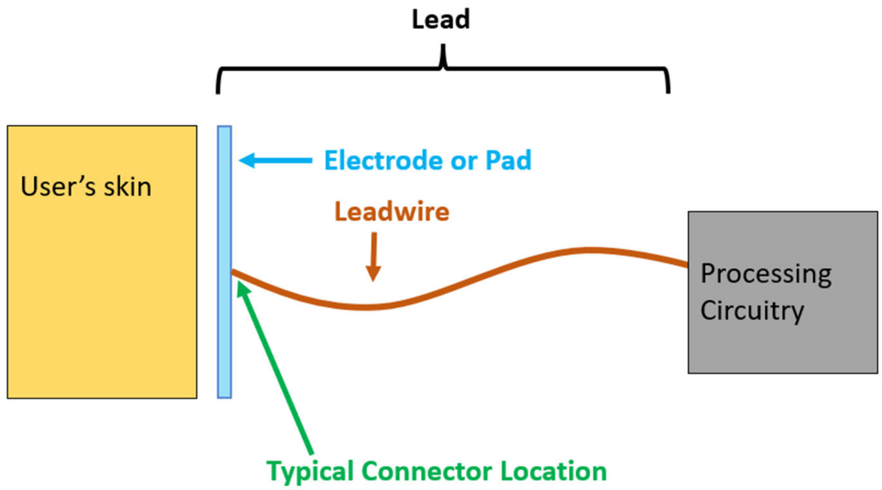
forming an outer and/or inner surface" or "*placed underneath an exterior surface and against an inner surface*." EX1003, ¶46; EX1001, 9:34-48.

2. Lead

A POSITA would have understood that a common definition of a lead is a "conductor, usually a wire, by which circuit elements or points are connected to components, devices, equipment, systems, points or materials. Also called a lead wire." EX1019, 414. Another technical dictionary defines a lead as an "electrocardiographic cable with connections within the electronics of the machine designated for an electrode placed at a particular point on the body surface." EX1020, 10162; EX1003, ¶47.

A POSITA would understand a common basic electrocardiogram (ECG)[3] system to include a number of "leads" typically formed from an "electrode" in contact with the user's skin (sometimes referred to as a "pad") and may include a "lead wire", one or more connectors, and other components to electrically couple a body electrical signal at the electrode to processing circuitry. For example, a typical ECG lead can be graphically illustrated as follows:

[3] Electrocardiogram is commonly abbreviated as either ECG or EKG. EX1008, 31.



Electric potentials measured by each lead are compared to other electrodes to determine a voltage (*e.g.*, a difference between two electrical potentials). The measured voltage is the ECG signal. EX1003, ¶48.

The '257 describes an electronic device with a sensor such that "electrical signals generated by the user can be transmitted from the user's skin through the electronic device housing to the leads." EX1001, Abstract. Accordingly, this device is a type of electrocardiogram (ECG). In the context of an ECG system, an "electrode" is a well-known term of art that a POSITA understands to mean a structure, such as a pad, that contacts the user's skin to detect the user's ECG. EX1003, ¶49.

The '257 patent does not explicitly use the term "electrode," but does describe a structure a POSITA would understand to mean an electrode, including a "pad." EX1001, 6:28-33. For example, the '257 patent explains: "to detect a user's

heartbeat or heart rhythm, however, the electronic device must provide at least two leads that the user contacts to detect the user's cardiac signals" and "contact is made between the user (e.g., the user's hand or finger) and the leads for cardiac signals to be detected." EX1001, 1:56-58, 6:27-28; EX1003, ¶50.

The '257 patent states that to "provide an electrical signal from the user to the processing circuitry, the leads can be exposed such that the user may directly contact the leads, or may instead or in addition be coupled to an electrically conductive portion of the device enclosure (*e.g*., a metallic bezel or housing forming the exterior of the device)." EX1001, 2:44-50. Consistent with its ordinary meaning as shown in dictionary definitions and based on the claims and disclosure of the '257 patent, a POSITA would understand a "**lead"** in context of the '257 patent to mean "*one or more conductive components that form at least a part of an electrical path from the user's skin to the processor*." EX1003, ¶51.

3. Pad

The term "pad" is recited in independent Claim 1 and a number of its dependent claims. The '257 patent states that a "lead can include a pad … placed on the outer or inner surface of an electronic device bezel or housing [which] can then be coupled to a wire or other connector for providing cardiac signals to a processor for processing." EX1001, 6:28-33. An electrode is often a conductive pad. The dictionary meaning of pad is "a thin flat mat or cushion." EX1016, 890. The '257

patent states a "pad" as "an extended area placed on the outer or inner surface of an electronic device bezel or housing" and which can then be "coupled to a wire or other connector for providing cardiac signals to a processor for processing." EX1001, 6:29-33. Consistent with its ordinary meaning to a POSITA, a "**pad**" in the context of the '257 patent means "*a thin mat that may be part of the electrical path of a lead, such as an electrode or a connection that is part of the lead*." EX1003, ¶52.

4. Pocket

The term "pocket" which is recited in dependent Claim 8. The '257 patent specification does not define the term pocket nor are there any drawings that illustrate what is meant by a pocket. Pocket is defined in the dictionary to be: "any pouchlike receptacle, compartment, hollow or cavity." EX1021. Consistent with this definition, a POSITA would understand the term **pocket** in the context of the '257 patent disclosure to be "*any pouchlike receptacle, compartment, hollow or cavity*." EX1003, ¶53.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

<u>Ground 1</u>: Petitioner requests that the Board cancel claims 1-4, 8, 10, 11 and 14 as unpatentable under pre-AIA 35 U.S.C. § 102 because these claims are anticipated by Mills.

Ground 2: Petitioner requests that the Board cancel claims 1-4 and 8-22 as unpatentable under pre-AIA 35 U.S.C. § 103 because they are obvious in view of Markel in combination with Mills.

B. Status of References as Prior Art

The following references are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	'257 patent (background section)	Admitted Prior Art
1005	Markel	Pre-AIA102(b) – published January 25, 2007
1006	Mills	Pre-AIA 102(b) – published October 4, 1994

These references constitute analogous art because they are from the same field of endeavor as the '257 patent, *e.g.*, devices for detecting cardiac signals via user contact. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, *e.g.*, detecting cardiac signals via a device exterior while maintaining an aesthetically pleasing design. As these references are analogous art, a POSITA is presumed to have been aware of them. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988).

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

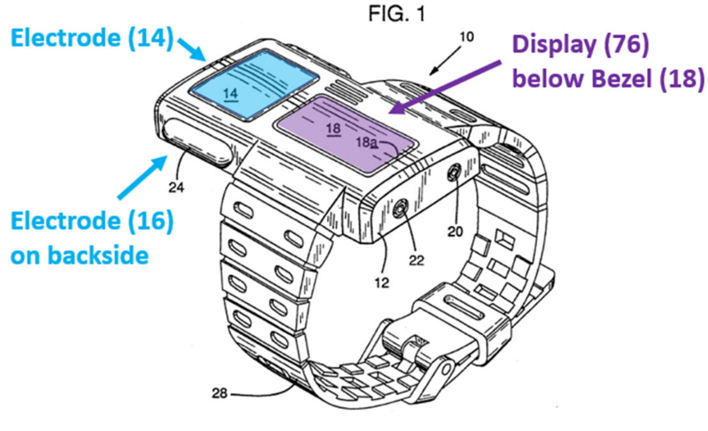
As explained below, claims 1-4 and 8-22 of the '257 patent are either anticipated or would have been obvious in view of the prior art identified below.

A. Overview of Key Prior Art

1. Mills

Mills published on October 4, 1994, as U.S. Patent No. 5,351,695. Mills discloses a "cardiac and data event monitor having dry skin electrodes integral with the monitor's housing." EX1006, Abstract. As shown in Fig. 1 (reproduced with annotations below), a wrist-worn ECG monitor 10 includes a first electrode 14 incorporated within housing 12 and a second electrode 16. According to Mills, an "object [of the invention] is to provide such a monitor that reliably detects and records ECG signals without the use of external electrodes or messy gels." EX1006, 1:39-42. Mills also states that "an object of the invention [is] to provide an improved dry skin electrode system that is an integral part of the housing of such a monitor. *Id.*, 1:43-45; EX1003, ¶54.

FIG. 1



2. Markel

Markel published on January 25, 2007, as U.S. Patent Publication No. 2007/0021677. Markel discloses a device that comprises one or more electrodes that are "adapted to detect cardiac activity of a user" of the device. EX1005, [0035]. In Fig. 4 of Markel (below), a mobile communication device 400 includes electrodes placed on or molded into regions 410b, 420b, that are "substantially concealed (or hidden) from a user." EX1005, Fig. 4 (reproduced below with annotations), [0039], [0040], [0045]. Markel provides an example, disclosing that "an electrode may comprise molded conductive plastic with little or no visible indication of the electrode presence." *Id.*, [0040]; EX1003, ¶55.

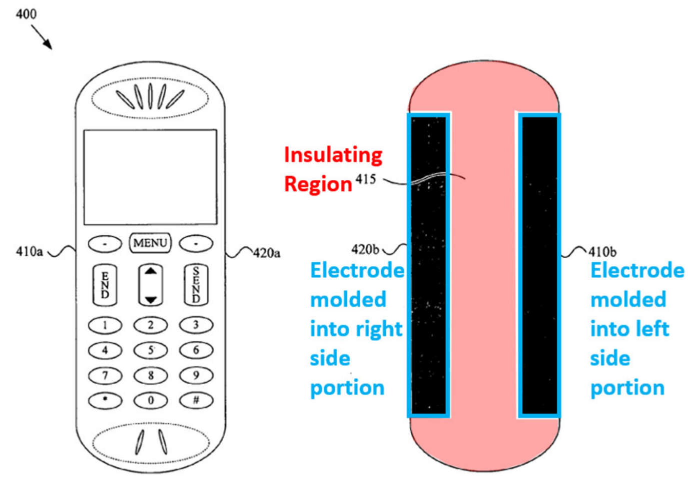


Figure 4

B. Ground 1: Claims 1-4, 8, 10, 11 and 14 are unpatentable as anticipated by Mills

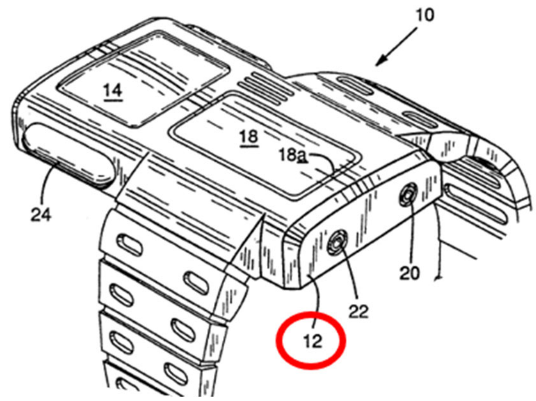
1. Claim 1: "An electronic device for detecting a user's cardiac signal, comprising"

Mills discloses a "wrist-worn cardiac data and event monitor having dry skin electrodes integral with the monitor's housing." EX1006, Abstract; EX1003, ¶56.

a. Limitation 1[a]: "an enclosure"

Fig. 1 of Mills (partially reproduced below) discloses an electronic device 10 for detecting a user's cardiac signal. EX1006, Fig. 1; 3:7-8. The device 10 includes a housing or enclosure 12. *Id.;* EX1003, ¶57.

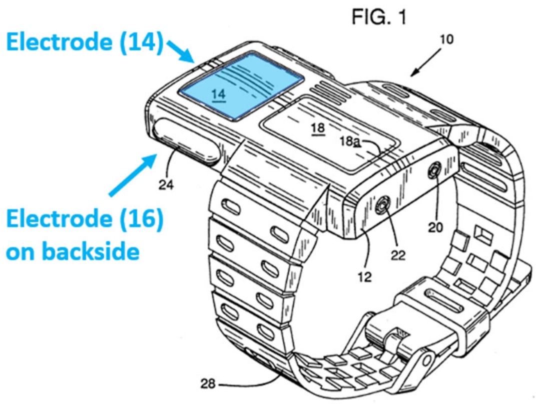
FIG. 1

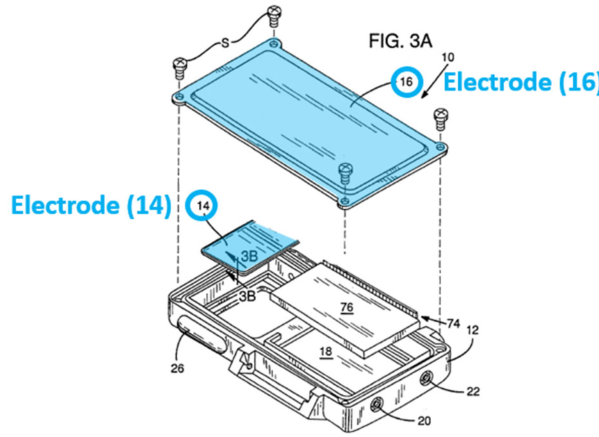


b. Limitation 1[b]: "a heart sensor configured to detect the user's cardiac signal"

Mills discloses a "wrist-worn cardiac monitor" (*i.e.*, a heart sensor) that "reliably detects and records ECG signals" (*i.e.*, cardiac signals). EX1006, Abstract, 1:11-12, 1:39-40; EX1003, ¶58. Mills discloses a wrist-worn ECG monitor 10. EX1006, Abstract, 1:11-12; 9:12-15. The '257 patent equates an ECG (or EKG)[4] monitor with a heart sensor: "heart sensor 112 can serve as an EKG monitor." EX1001, 6:5-6. The heart sensor of Mills comprises two leads (electrodes) designated 14 and 16, as annotated below in Figs. 1 (top view) and 3A (bottom exploded view). Lead 14 is the "first lead" and lead 16 is the "second lead" of Claim 1 as discussed further below.

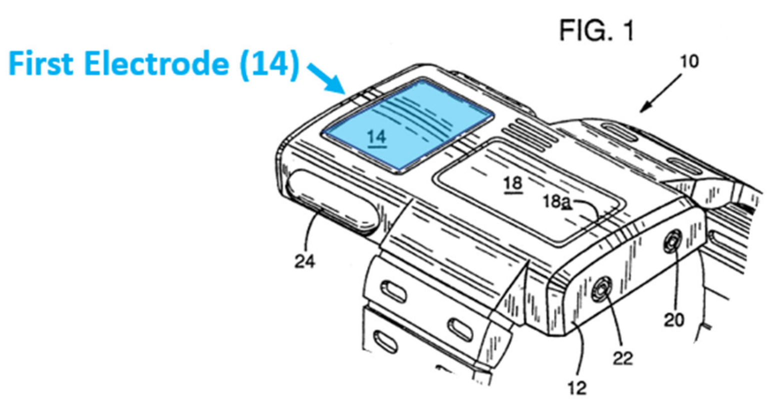
[4] Electrocardiogram is abbreviated as both ECG and EKG. EX1003, ¶48, n.2.





i. **Limitation 1[b(i)]: "a first lead comprising a first pad"**

As explained above, a POSITA would understand a pad to be an electrode and a lead to be one or more conductive components that form at least a part of an electrical path from the user's skin to the processor, including an electrode. Electrode 14 of Mills (Fig. 1, partially reproduced below) is a pad that forms part of the first lead of Mills. EX1006, 7:16-18; EX1003, ¶59.



To be sure, Mills equates the term electrode with a pad:

> "*electrode* **14** comprising such plated expanse obviates use of a messy, conductive gel, and even the so-called "residue-free' self-adhesive gelatinous *pads* that often are used to enhance conductivity between an electrode and a patient's skin."

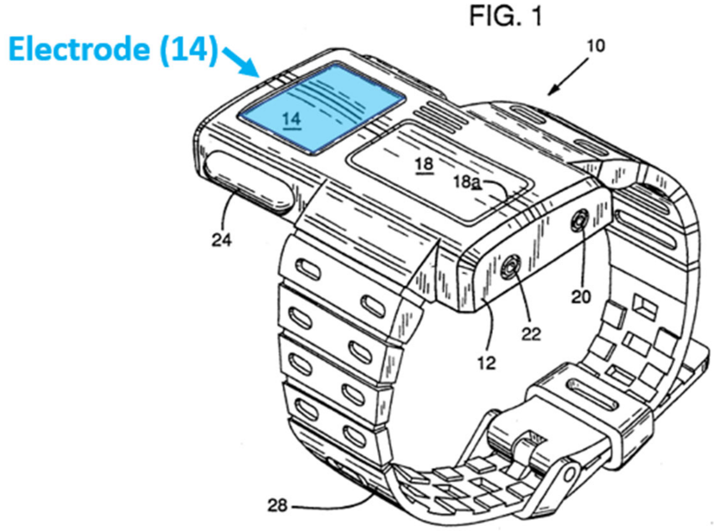
EX1006, 4:19-24 (emphasis added); EX1003, ¶59. And the '257 patent states that a "lead can include a pad or extended area placed on the outer or inner surface of an electronic device … housing" and which can then be "coupled to a wire or other connector for providing cardiac signals to a processor for processing." EX1001, 6:29-33.

Electrode 14 of Mills is a thin mat that is part of the electrical path and covers an extended area on the outer surface of the device housing (as shown above in Fig. 1) and is internally connected to provide cardiac signals as explained below. EX1006, 4:67-5:3; 7:16-18. Accordingly, Mills discloses a first pad - electrode 14. EX1003, ¶59.

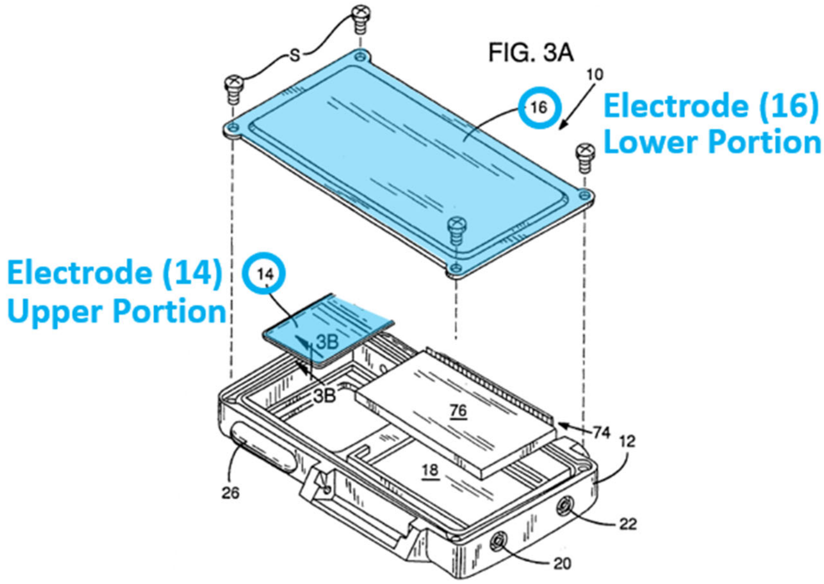
ii. Limitation 1[b(ii)]: "embedded in a first portion of the enclosure"

Fig. 1 of Mills discloses its electrode 14 (first pad) is "integrally molded" (*i.e.*, embedded) into the housing. EX1006, Fig. 1; 3:8-9; EX1003, ¶59.

FIG. 1

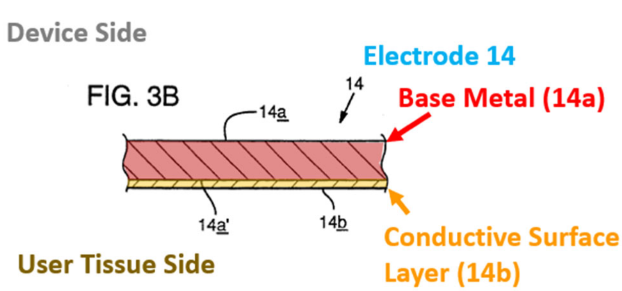


Mills further discloses the heart sensor "comprises a housing 12 including first and second dry skin electrodes 14, 16 unitarily connected therewith and forming an ***integral*** part thereof." 1006, 3:8-11 (emphasis added). Mills refers to electrode 14 as the "upper electrode" and electrode 16 as the "lower electrode." EX1006, 4:65-67. Fig. 3A of Mills, partially reproduced below, illustrates these electrodes, 14 and 16, located on different portions of the enclosure, which may be referred to as an upper portion and a lower portion, respectively. EX1003, ¶59.



Not only is each of electrodes 14 and 16 embedded into the housing 12 by being "integrally molded" into housing 12, each electrode 14 and 16 also has a base material embedded underneath an outer surface coating. Fig. 3B of Mills (reproduced below left with annotations) illustrates a cross-section of "an electrode such as electrode 14." EX1006, 3:67-68. The construction shown consists of a base metal **14a** on an inner surface and "an outer, skin-contactable region or surface **14a**." EX1006, 4:4-5. Thus, the pad (base metal 14a) is positioned underneath the exterior of the first portion (conductive surface coating 14b) and is therefore also embedded under the exterior of the first portion. This two-layer construction is similar to the construction shown in Fig. 4B of the '257 patent (below right with annotations) and both are motivated mainly for aesthetic reasons. EX1006, 4:35-39; EX1001, Abstract; EX1003, ¶59.

Mills



'257 Patent

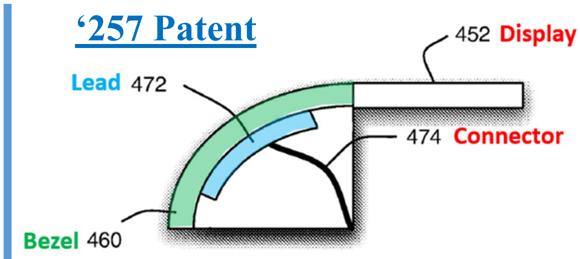


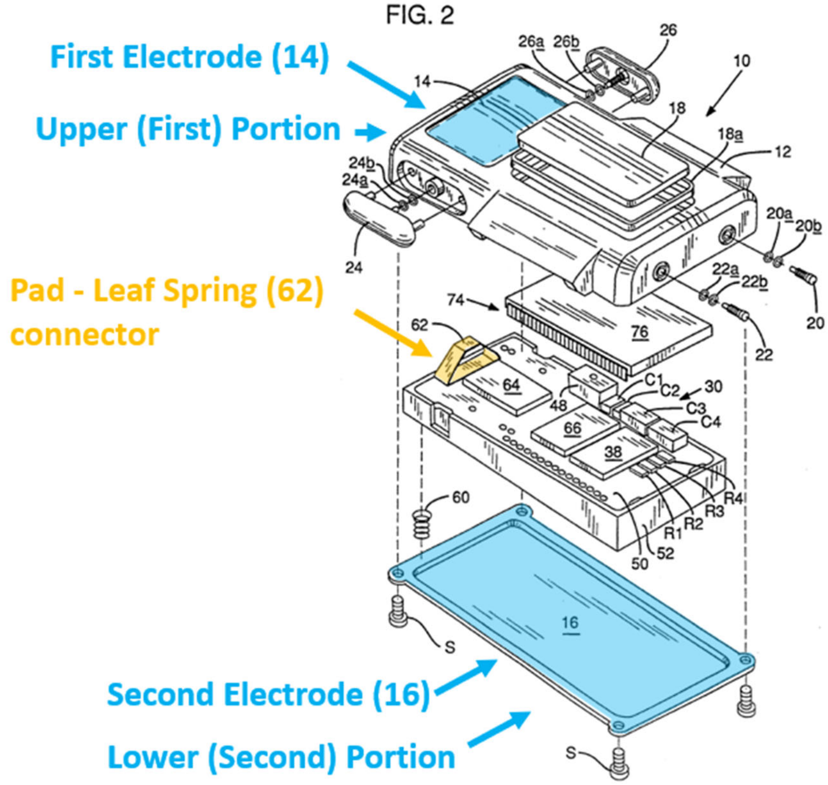
FIG. 4B

"[A]another … bezel with an embedded heart sensor lead" Ex. 1001 at 9:37-38.

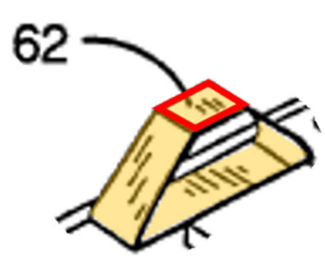
Mills explains "14a [is] electrically connectable with such monitoring equipment, as illustrated in FIGS. 1 and 2." EX1006, 4:2-3. Mills further explains its "plating [exterior surface 14b] also has been found to provide high conductivity and thus to produce a high quality electrical interface between an electrode such as electrode 14 and the patient's skin surface, which may be very dry." EX1006, 4:43-47. Thus, Mills teaches and a POSITA would understand that this first pad, electrode 14a, is configured to detect an electrical cardiac signal via the user's skin's contact with the exterior surface 14b of the first portion of the enclosure. EX1003, ¶59.

In addition to the above described ways in which Mills meets the limitation of this Claim 1, Mills further discloses electrode 14 is physically and electrically connected to processing circuitry by a leaf spring 62 as shown in Fig. 2 (reproduced below with annotations). *Id.* at 4:67 – 5:3; *See also Id.* at 4:1-3; EX1003, ¶60.

FIG. 2



Mills teaches that "electrode 14 is connected to the … signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50." EX1006, 4:67 – 5:3. The top of the trapezoid-shaped leaf spring 62 is a pad.

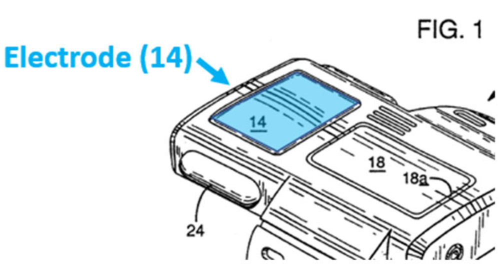


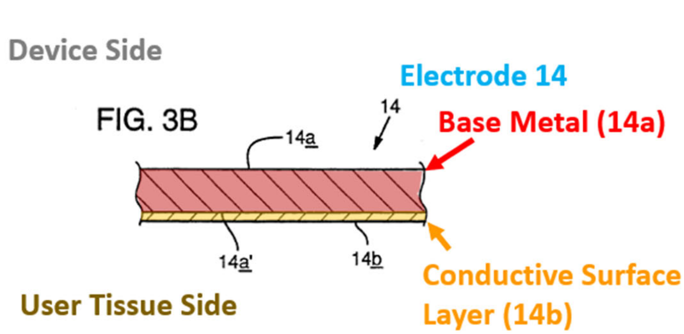
The pad is pressed against the inner wall of electrode 14 in Mills and surrounded by the housing 12 of Mills and is therefore embedded in the device of Mills.

Accordingly, leaf spring 62 is a pad that is embedded in the enclosure of device of Mills. The pad is underneath the exterior surface and the pad is configured to detect an ECG signal of the user via its contact with electrode 14 located on the exterior surface. EX1003, ¶60.

iii. Limitation 1[b(iii)]: "an exterior surface of the enclosure comprises an exterior surface of the first portion"

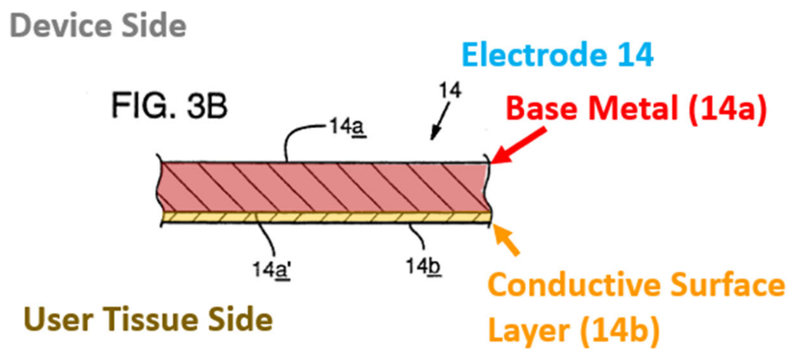
Fig. 1 of Mills (below left) discloses a housing 12 with electrode14 which is a first portion forming part of the exterior surface of Mills. Further, electrode 14 (first portion) has an exterior surface 14b shown in Fig. 3B, below right. *Id*. at 2:16-20; EX1003, ¶60.



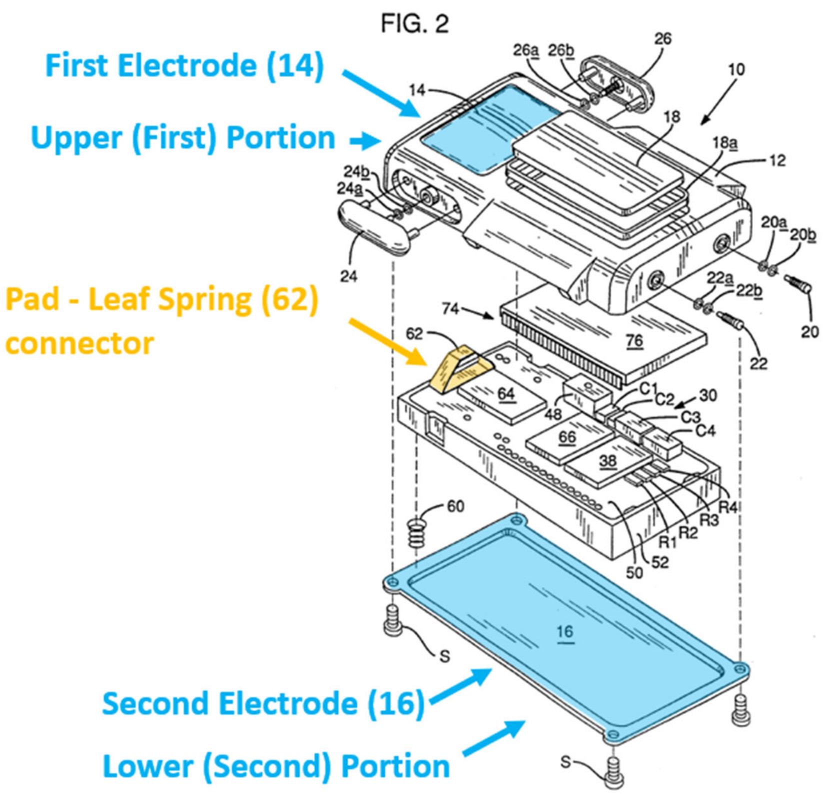


iv. Limitation 1[b(iv)]: "the first pad is positioned underneath the exterior surface of the first portion"

As discussed above with regard to Fig. 3B of Mills, embedded lead 14a is underneath or covered by the exterior surface 14b. Mills at Fig. 3B, EX1006, 4:43-47; EX1003, ¶60.



Alternatively, the pad of leaf spring 62 is positioned underneath the electrodes/first portion 410b which forms an exterior surface of Markel. EX1006, Fig. 2; EX1003, ¶60.



v. Limitation 1[b(v)]: "wherein the first pad is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion of the enclosure"

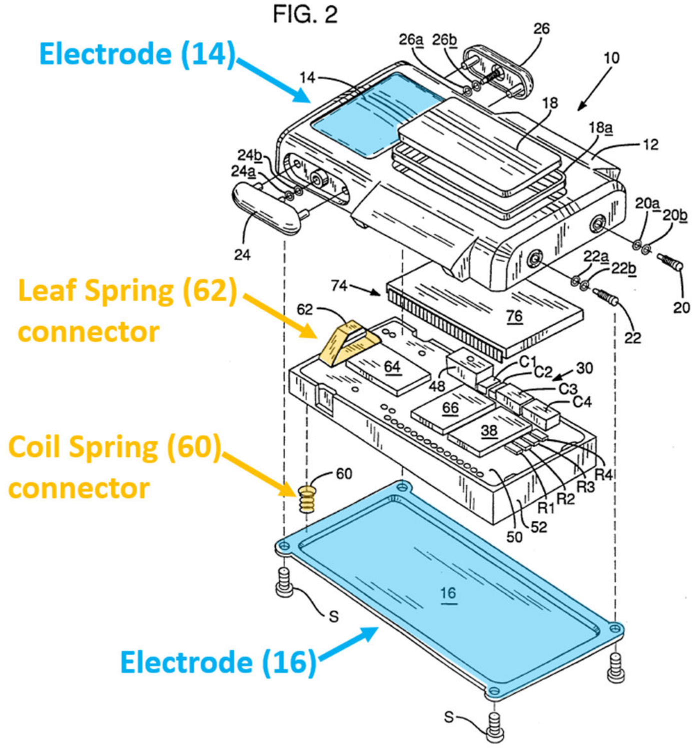
Mills discloses that when the cardiac data apparatus 10 is positioned on the left wrist, the palm of the right hand is placed into contact with upper electrode 14. EX1006, 6:63–7:1. Mills further discloses "Dry skin electrodes 14, 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10" – a wrist-worn cardiac data monitor. EX1006, 3:62-67. A POSITA would understand from this disclosure the electrode 14 (pad) of Mills is configured to detect a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the electrode 14b which passes through base portion 14a of electrode 14. EX1003, ¶60.

Further, the leaf spring 62 carries the electrical signal from the electrode 14 through the leaf spring 62 via the leaf spring's top pad to a printed circuit board (PCB), PCB 50 of Mills and ultimately to microcontroller chip 42 of Mills. EX1006, 4:55-60; 4:68-5:3; EX1003, ¶60.

vi. Limitation 1[b(vi)]: A second lead comprises a second pad

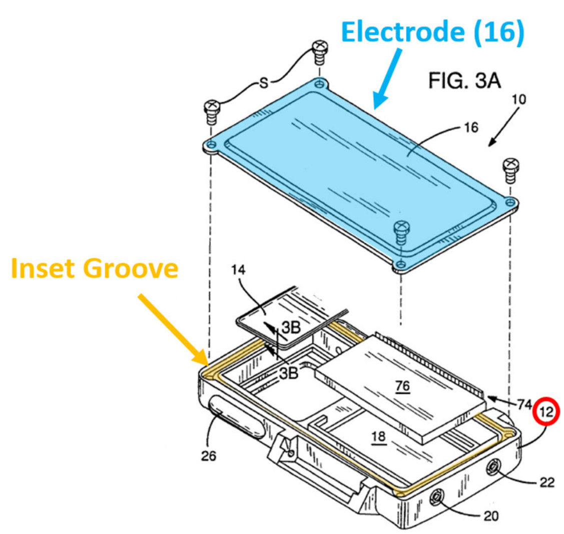
Electrode 16 of Mills (Fig. 2 reproduced below with annotations) is a second pad and coil spring 60 is a leadwire. Electrode 16 and coil spring 62 form a second lead. As above, Mills teaches and a POSITA would understand that this second pad, electrode 16, is configured to detect an electrical cardiac signal via the user's skin's contact with the exterior surface of the second portion of the enclosure and communicate that electrical cardiac signal through coil spring 60 to a processing arrangement discussed below. EX1006 at 3:8-9; 4:17-19; 8:10; EX1003, ¶61.

FIG. 2



i. Limitation 1[b(vii)]: embedded in a second portion of the enclosure

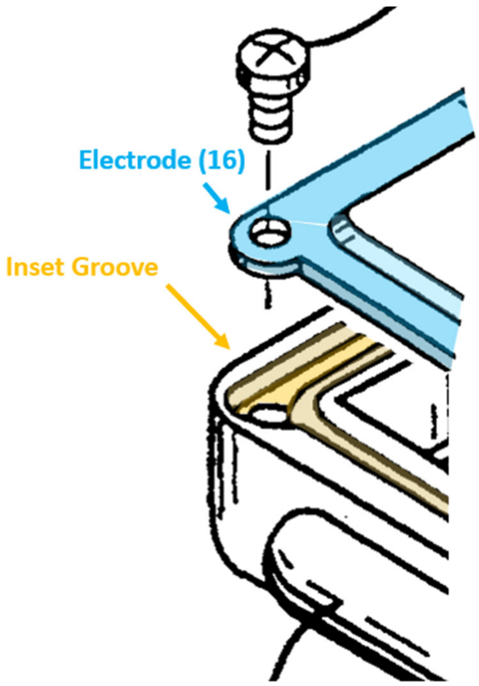
Electrode 16 of Mills is embedded in housing 12. Fig. 3A of Mills shows the electrode 16 attached by screws and inserted into an inset groove of the housing 12. Mills at Fig. 3A. Electrode 16 of Mills is embedded in housing 12 because it is placed in the thickness of a surrounding material and forms an outer surface. Fig. 3A of Mills shows the electrode 16 attached by screws and is integral with housing 12. EX1006, 1:12-13, 3:47-51, Fig 3A. Electrode 16 is embedded into the housing 12 because a portion of electrode 16 is inset (placed in the thickness) into a groove (surrounding material) of housing 12 and forms an outer surface. *Id.* As shown, the electrode 16 is shaped to fit within the hollowed inset groove. *Id.*; EX1003, ¶62.



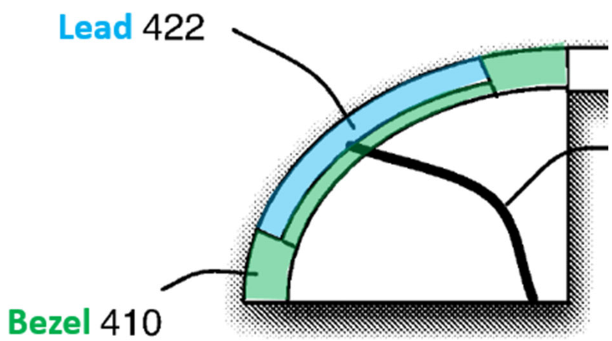
Comparing this inset groove of Mills to the '257 patent's disclosure in Fig. 4A, the resulting embedded nature of electrode 16 of Mills inserted into the inset groove of

its housing is nearly identical to the embedded nature of the electrode (lead 422) of Fig. 4A of the '257 patent:

<u>Mills Fig. 3A</u>

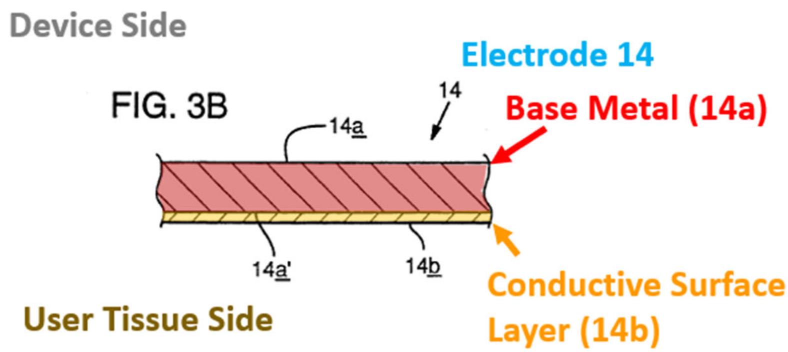


<u>'257 Fig. 4A</u>



EX1003, ¶62.

Additionally, Mills' second electrode 16 includes identical material content and cross-sectional structure as the first lead 14 discussed above. EX1006, 4:10-13. Thus, as illustrated in Fig. 3B (below with annotations), electrode 16 includes a base metal portion 14a, which is a pad embedded under conductive surface layer 14b. EX1006, Fig. 3B; EX1003, ¶63.



A POSITA would understand from the above disclosure that electrode 16 with its base metal pad 14a is embedded into the housing 12 with exposed outer conductive surface 14b forming an exterior surface. *Id.* at Fig. 3A; EX1003, ¶63.

ii. Limitation 1[b(viii)]: "wherein the second pad is configured to detect a second electrical signal of the user's cardiac signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure"

Mills discloses that when the cardiac data apparatus 10 is positioned on the left wrist, the electrode 16 is in contact with the user's skin of the left wrist thus providing an electrical signal representative of the patient's cardiography. EX1006, 6:63–7:1. Mills further discloses "Dry skin electrodes 14, 16 are designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10.". EX1006, 3:62-67. A POSITA would understand Mills discloses this limitation based on the above disclosure. EX1003, ¶63.

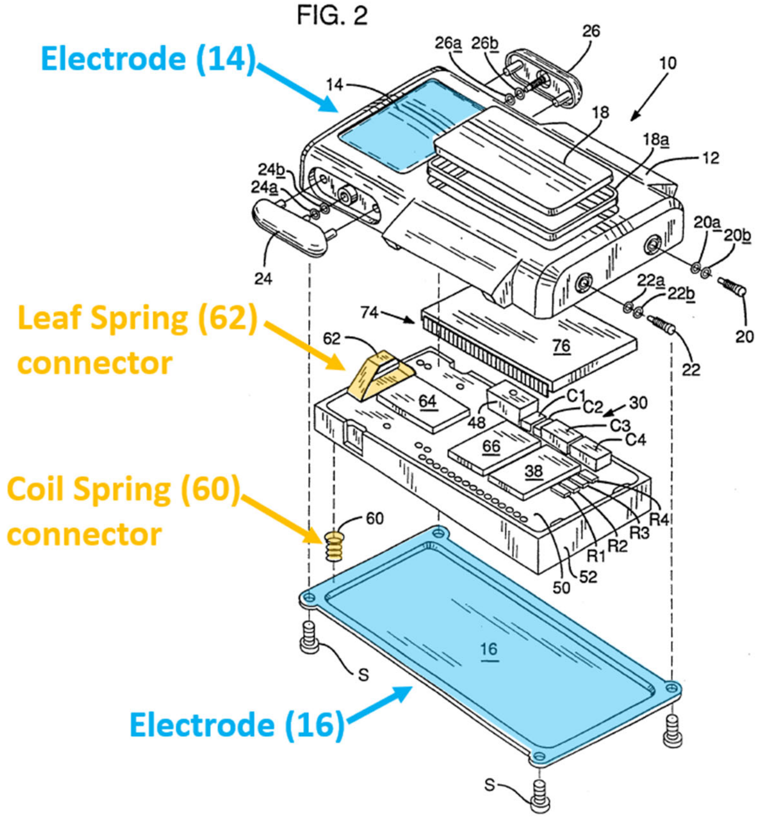
c. Limitation 1[c]: "a processor coupled to the heart sensor and configured to receive and process the detected cardiac signal"

Mills discloses that the housing 12 comprises a very-large scale integrated (VLSI) circuit chip that includes an "ECG signal and abnormal event detection circuitry, analog-to-digital (AD) and digital-to-analog (DA) conversion circuitry, memory and processor circuitry." EX1006, 2:3-6~~8~~. Mills also discloses its "microprocessor and associated electronics, including firmware executed thereby, employs a digital bandpass filter reliably to detect ECG signals." EX1006, 2:20-23. Mills further specifies that the VLSI is surface-mounted on the top side of printed circuit board (PCB) 50. *Id.* at 5:18-19. Electrodes 14 and 16 are electrically connected to the PCB 50 via a respective spring (60/62). *Id.* at 4:55-5:3. Accordingly, a POSITA would understand the VLSI is a processor coupled to the heart sensor (electrodes) and is configured to receive and process the detected cardiac signal. EX1003, ¶65.

i. Limitation 1[c(i)]: "wherein the first lead comprises a first connector coupled to the first pad and provides the first electrical signal detected by the first pad to the processor"

Fig. 2 of Mills (reproduced below with annotations) illustrates electrode 14 connected to the leaf spring 62, which connects electrode 14 to the VLSI processor. EX1006 at 4:67 – 5:3; *see also* 4:1-3. Accordingly, leaf spring 62 is a first connector coupling electrode 14 (first pad) to the processor of Mills. EX1003, ¶¶60, 65.

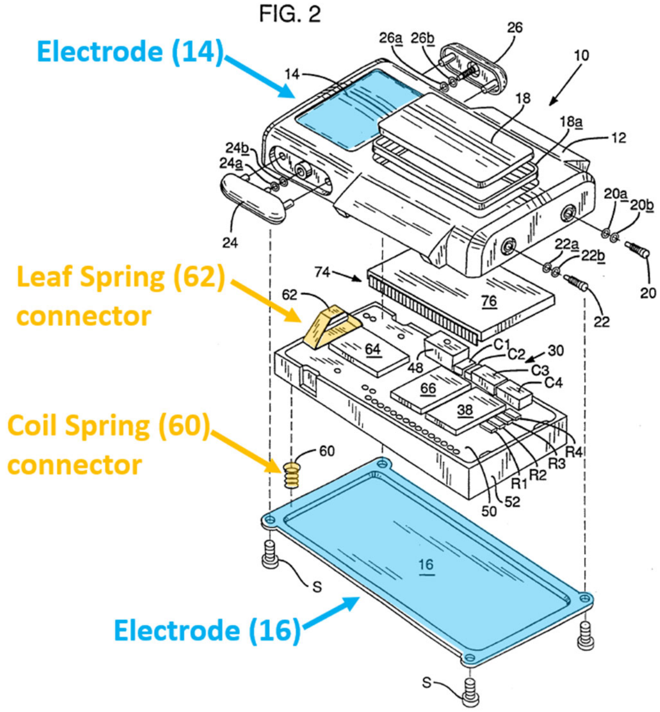
FIG. 2



ii. Limitation 1[c(ii)]: "wherein the second lead comprises a second connector coupled to the second pad and provides the second electrical signal detected by the second pad to the processor"

Fig. 3A of Mills (reproduced in part and annotated below) discloses lead 16 connected to the coil spring 60 which in turn connects to a circuit pad 58 on PCB 50 and the VLSI. EX1006 at 4:55 – 5:3; *See also Id.* at 4:1-3; EX1003, ¶¶61, 65.

FIG. 2



In other words, the electrical signals detected by the electrode 16 are passed via the coil spring 60 to the PCB 50 and then to the processor of the VLSI. Thus, coil spring 60 is a connector coupled to the second pad. EX1003, ¶¶61, 65.

d. Claim 1 conclusion

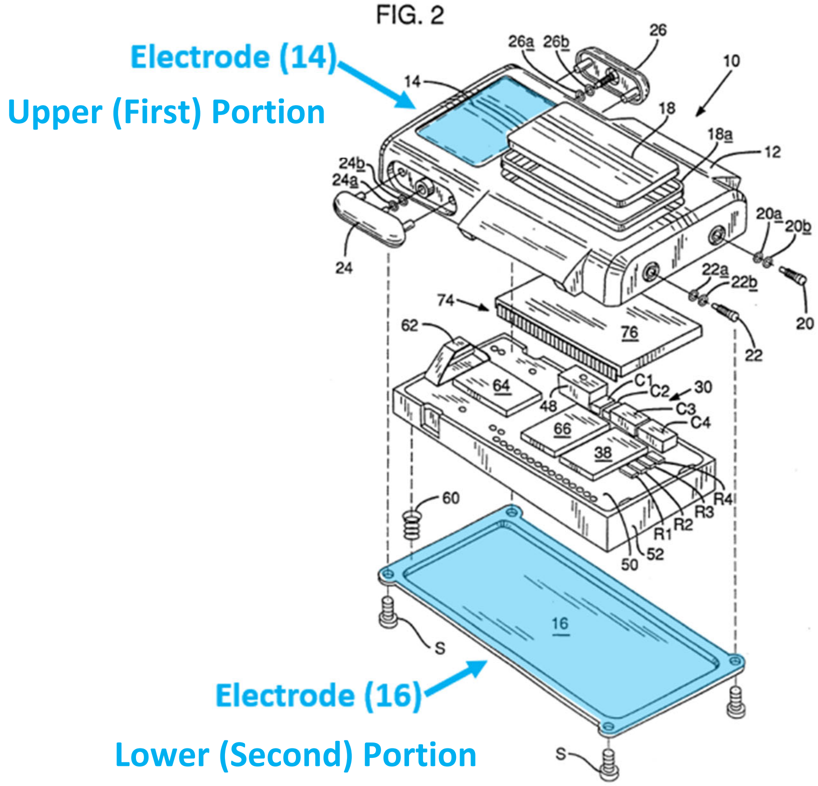
For the reasons set forth above, claim 1 is anticipated by Mills. EX1003, ¶66.

2. Claim 2: "wherein the first portion and the second portion are located on opposite sides of the electronic device"

Mills describes electrode 14 as the "upper electrode" and electrode 16 as the "lower electrode." EX1006, 4:65-67. Fig. 2 of Mills (reproduced below with annotations) shows these electrodes, 14 and 16, which are located on different portions of the enclosure. The upper or first portion of housing 12 has integrated

electrode 14 on one side (top side) of the cardiac data apparatus 10 and the lower or second portion of the housing 12 has integrated electrode 16 on another side (bottom side) that is opposite of the side having the first portion. EX1006, Fig. 2, EX1003, ¶67.

FIG. 2



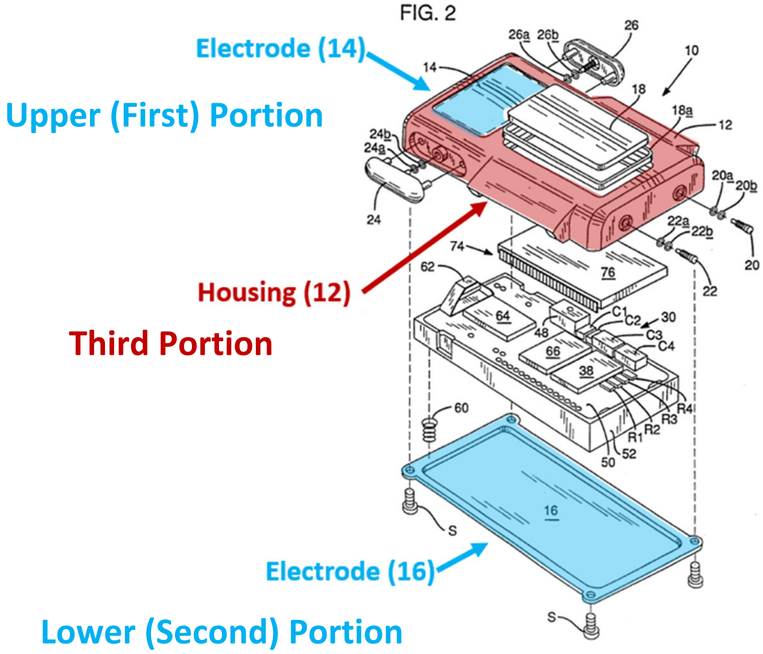
3. Claim 3: "wherein the first portion is electrically isolated from the second portion"

Mills discloses a housing 12 which separates its two electrodes 14, 15. EX1005, Fig. 2. Mills discloses its housing 12 may be molded plastic, such as acrylonitrile-butadiene-styrene (ABS). EX1006 at 6:40-43. Plastics, in general, are well-known electrical insulators and ABS plastic is an electrical insulator.

Accordingly, Mills teaches that the first and second portions are electrically isolated.

EX1003, ¶68.

FIG. 2

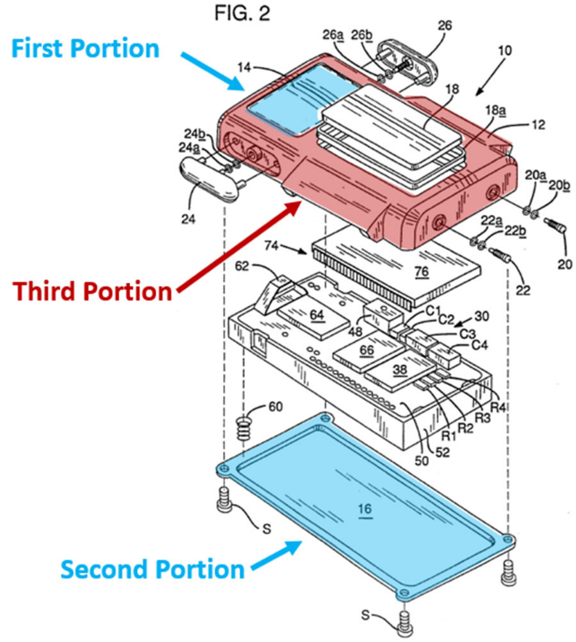


4. Claim 4: "the first portion is separated from the second portion by a third portion of the enclosure; at least the third portion is constructed from a material having a first conductivity; and the first conductivity is insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion"

Mills discloses that the housing 12 may be molded plastic, such as ABS plastic. As noted above with regard to Claim 3, ABS plastic is an electrical insulator having a first conductivity. EX1006, 6:40-43. Accordingly, Mills discloses that a first portion of its enclosure, containing a first pad (electrode 14), and a second portion of its enclosure, containing a second pad (electrode 16), are separated by a

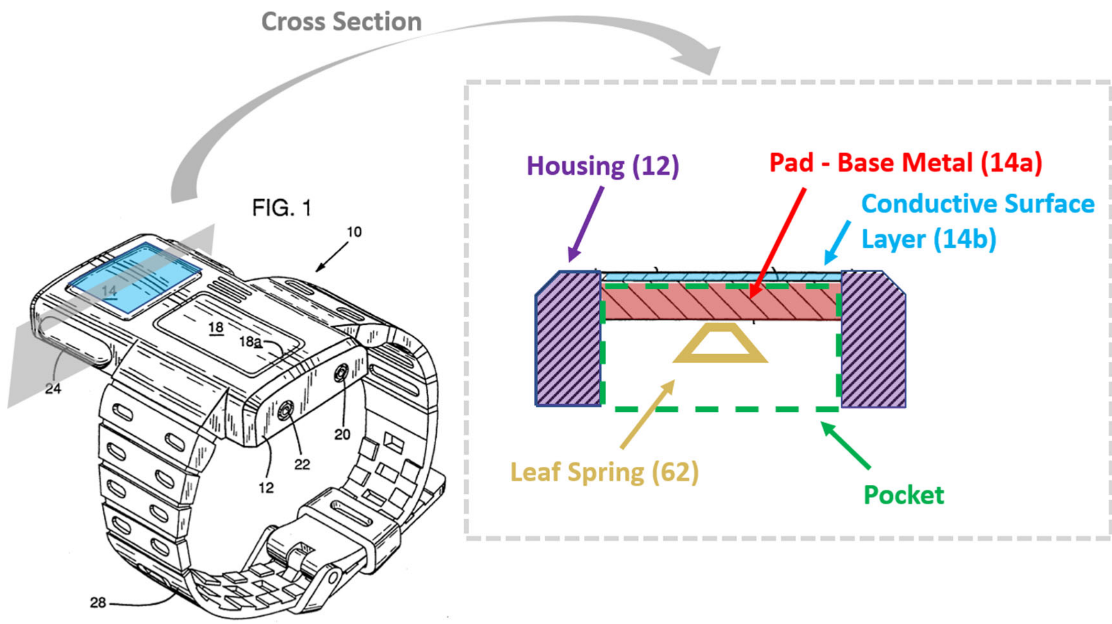
third portion of its enclosure, housing 12. Further, a POSITA would understand that the first portion including electrode 14 and the second portion including electrode 16 need to be electrically isolated from each other via housing 12, for example. A POSITA would understand that the housing would need to have a suitably high ("insufficient") conductivity in order to prevent the differential ECG signal between electrodes 14 and 16 from degrading by going from one electrode to the other rather than each going directly to a different input of the processor. This is basic electrical engineering circuit theory that a POSITA in the relevant time period would have been well aware of. *See, e.g.*, EX1015. A POSITA would understand that two or more wires or other electrical connections would each be separated by an appropriate insulative material to prevent degradation of the measurement caused by the potential shorting between different electrical pathways. Basic electrocardiography teaches that the conductivity of the material separating the two electrodes must have a low enough conductivity such that the cardiac signal from the user does not shunt across the two electrodes. EX1003, ¶¶69-70.

FIG. 2

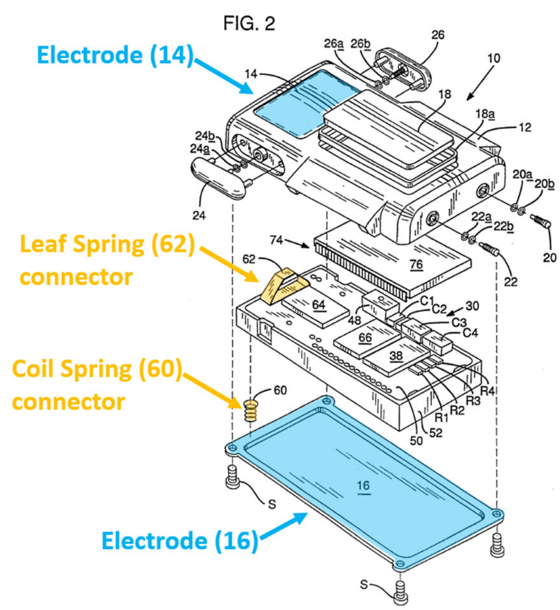


5. Claim 8: "the enclosure further comprises at least one pocket underneath the exterior surface of the enclosure; and at least one of the first pad and the second pad is placed within the at least one pocket"

Electrode 14 of Mills has an outer surface portion 14b and an inner base metal pad portion 14a. EX1006, Fig. 3B. Housing 12 and outer surface portion 14b of electrode 14 form a pocket into which the inner base metal pad portion 14a underneath the exterior surface 14b of the enclosure. EX1006 at Figs. 1, 3B. The pocket is illustrated below. EX1003, ¶72.



Additionally, leaf spring 62, a pad as explained above in Claim 1, is also within the pocket as shown above (cross section right) and below (Fig. 2 with annotations). EX1003, ¶73



6. Claim 10: “the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second portion of the enclosure”

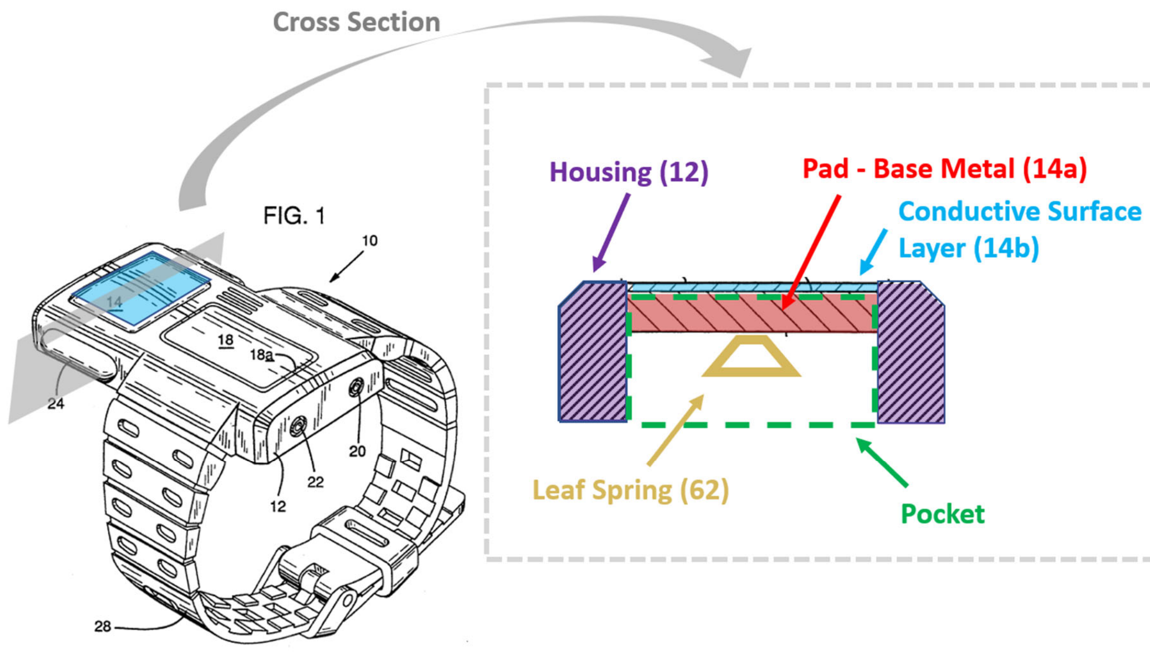
Mills teaches that electrode 16 (second lead), which is part of the second portion of the enclosure, is “designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient’s skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10.” EX1006, 3:62-67. EX1003, ¶74

7. Claim 11: “the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second lead”

Mills teaches that electrode 16 (second lead) is “designed for use with equipment capable of producing or monitoring changing electrical conditions (indicative of changing cardiographic conditions) at the surface of a patient's skin, and are particularly suitable in cardiac monitoring, e.g. by apparatus 10.” EX1006, 3:62-67; EX1003, ¶75.

8. Claim 14: “an interior surface of the enclosure comprises an interior surface of the first portion, wherein the first pad is positioned on the interior surface of the first portion”

As shown in the diagram below (annotated Figs. 1 and 3B of Mills), first portion of housing 12 (enclosure) contains electrode 14. Electrode 14 consists of an outer conductive surface 14b and a pad 14a under the conductive surface 14b and positioned on the interior surface of 14b. EX1003, ¶76.



Alternatively, Fig. 2 of Mills illustrates leaf spring 62 (included in illustration above) which forms a pad (top portion of leaf spring 62) which is positioned on an interior side of the first portion of the outer enclosure - electrode 14. EX1003, ¶77.

C. Ground 2: Claims 1-4 and 8-22 are unpatentable as obvious in view of Markel in combination with Mills.

1. Claim 1: "An electronic device for detecting a user's cardiac signal, comprising"

Markel discloses "electronic devices with cardiovascular monitoring capability." *See* EX1005, Abstract; [0035]; EX1003, ¶78.

a. Limitation 1[a]: "an enclosure"

Markel discloses that the mobile communication device MCD 100 (also referred to as "device 100") includes a main body portion 110 as shown, for example, in Fig. 1. EX1005, [0034], Fig. 1.

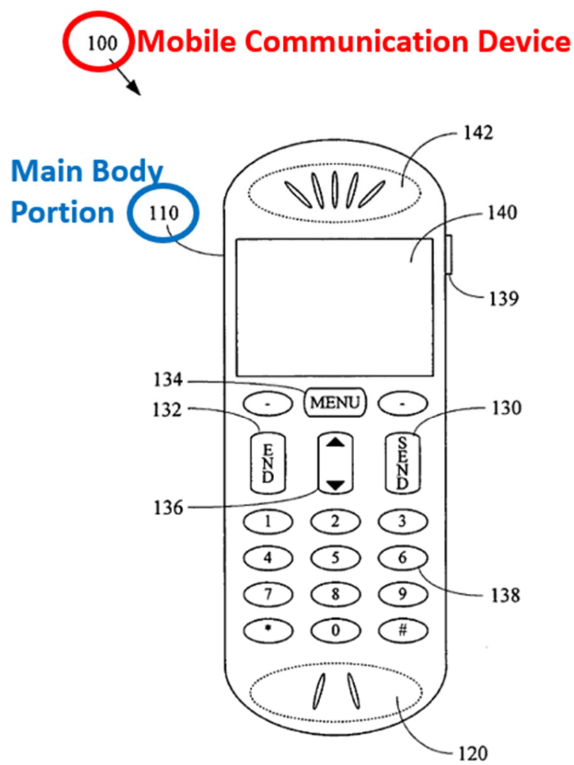


Figure 1

According to Markel, the main body portion 110 "may comprise the portion of the MCD 100 that is generally held in the hand during normal use of the MCD 100." EX1005, [0043], [0064]. Furthermore, Markel states that the device "may comprise a primary casing or housing for the user interface device." EX1005, [0064]. A

POSITA would understand from this disclosure that Markel discloses an enclosure. EX1003, ¶79.

b. Limitation 1[b]: "a heart sensor configured to detect the user's cardiac signal"

Markel discloses that the MCD 100 may comprise at least one cardiac sensor "that is adapted to detect cardiac activity of a user of the MCD 100" with the user being "conductively coupled to the electrodes (*e.g.*, by touching the electrodes) which is a type of heart sensor that detects a cardiac signal. EX1005 at [0035]; [0058]; [0082]; [0103]; EX1003, ¶80.

i. Limitation 1[b(i)]: "a first lead comprising a first pad that is embedded in a first portion of the enclosure"

Markel discloses electrodes for detecting the cardiac signals "may be disposed in any of a variety of locations" on its device including being "generally … [or] substantially concealed (or hidden) from a user. EX1005, [0045], [0039]-[0040]. Such electrodes may be "exposed for user contact" or "may be integrated into various molded components." *Id.*, [0037]; EX1003, ¶81.

Markel discloses an example of device 400 in Fig. 4. EX1005, [0045]. A first electrode is "placed on or molded into the region 410b." *Id.* A POSITA would understand that Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure. *Id.*; EX1003, ¶82.

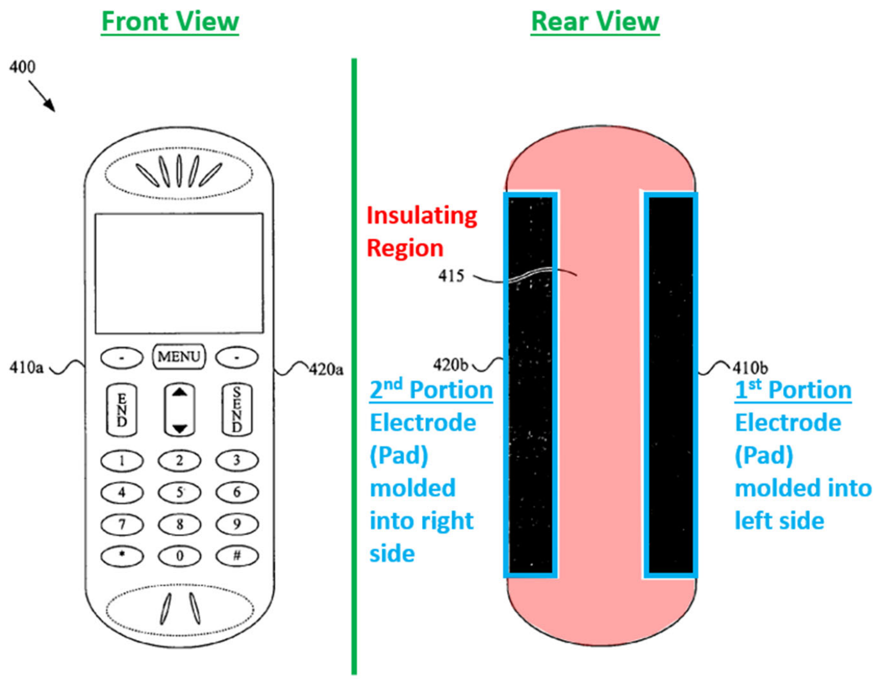


Figure 4

Markel further discloses, as shown in Fig. 10 below, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand electrodes 1020, 1022 correspond to electrodes 410b and 420b. Accordingly, Markel teaches an electrode on the exterior surface of an enclosure where the electrode detects an electrical signal of the user's cardiac signal from contact with the user's skin. EX1003, ¶83.

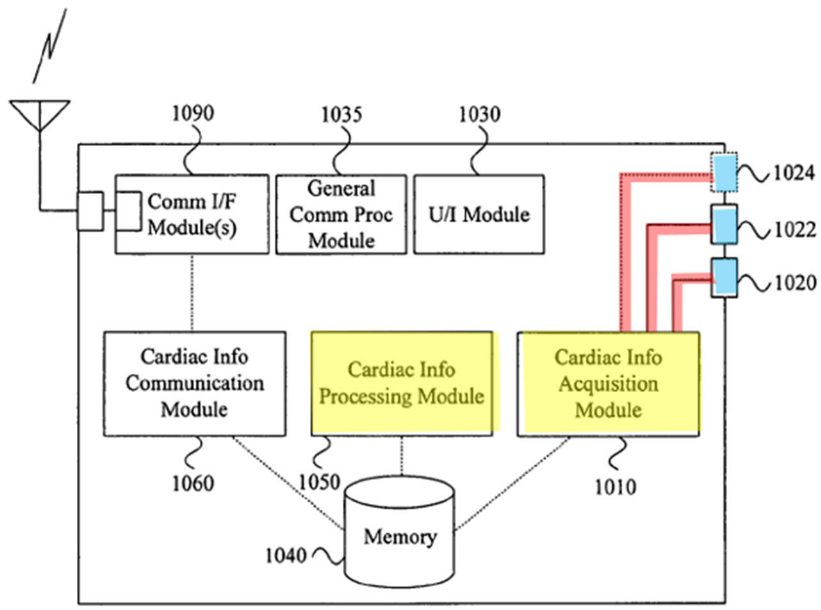
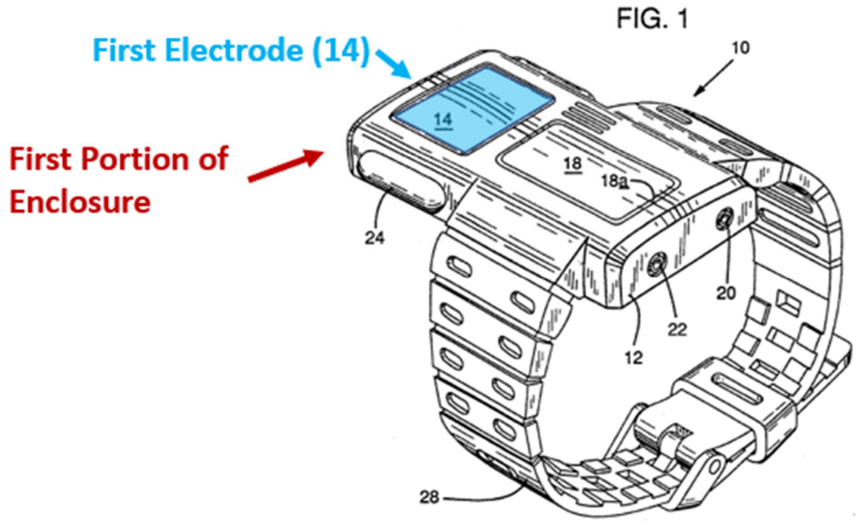


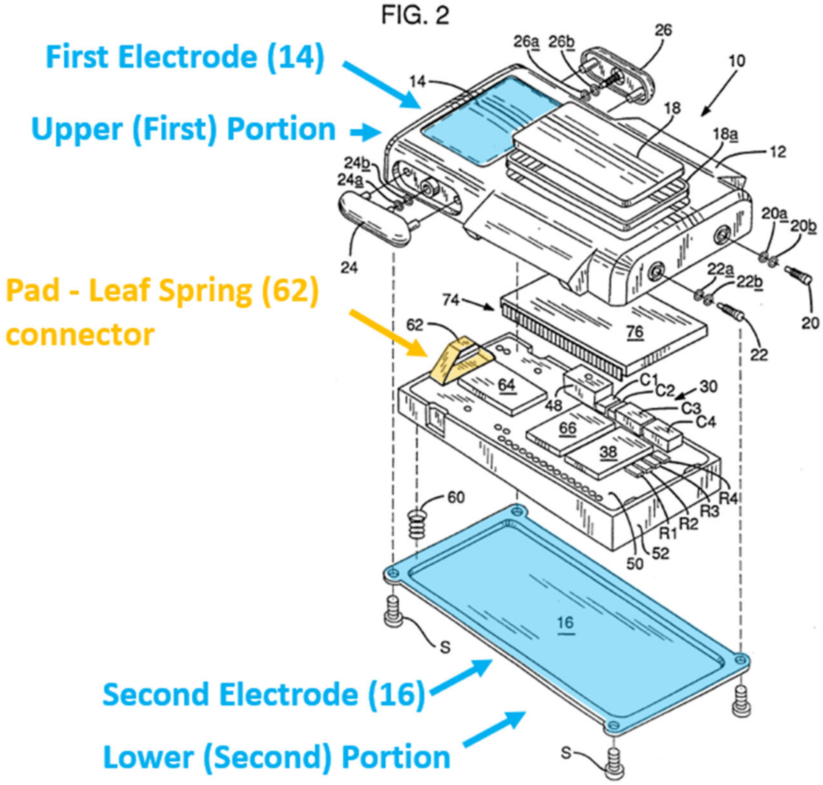
Figure 10

Markel does not provide details of the internal components of its device. A POSITA looking to implement Markel would have looked to other references in the same field of disclosure for information on internal components and structures to make the device of Markel. Mills, for example, discloses an enclosure (housing 12) which includes a first exterior electrode 14. EX1006, Fig. 1, 3:8-9. Mills' electrodes are similar to Markel's electrodes 410b, 420b. EX1003, ¶84.

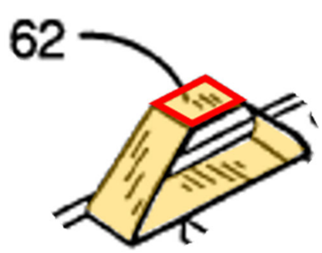


Mills further specifies that the electrode 14 forms an integral part of the housing 12 by being molded therein, again similar to Markel's disclosure. EX1006, 3:47-51; EX1005, [0045]. Mills further discloses electrode 14 is physically and electrically connected to processing circuitry by a leaf spring 62 as shown in Fig. 2 (reproduced below with annotations). EX1006, 4:67-5:3; EX1003, ¶84.

FIG. 2



Mills teaches that "electrode 14 is connected to the … signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50." EX1006, 4:67-5:3. The top of the trapezoid-shaped leaf spring 62 is a pad.



The pad is pressed against the inner wall of electrode 14 in Mills and surrounded by the housing 12 of Mills and is therefore embedded in the device of Mills.

Accordingly, leaf spring 62 is a pad that would be embedded in the enclosure of device of Mills. The pad is underneath the exterior surface and the pad is configured to detect an ECG signal of the user via its contact with electrode 14 located on the exterior surface. EX1003, ¶¶84-85.

It would have been obvious to incorporate the pad (leaf spring 62) teachings of Mills into the device of Markel because Mills provides details of internal physical connections on which Markel is silent. Markel teaches that "electrodes may be incorporated into the MCD 100 in any of a variety of manners," which would include using a pad underneath the exterior surface. EX1005, [0035]. Leaf springs are well known electrical connectors commonly used in the art. Leaf springs are commonly employed as electrical connectors because they provide good electromechanical contact between two components. Leaf springs are often placed between two components as an electrical connector (or bridge) and mechanical pressure is applied such that the leaf spring pushes against both components to maintain good contact pressure. Leaf springs are commonly used because they solve manufacturing and assembling complexities by, for example, eliminating the need to solder a wire between the electrode and a circuit board to electrically connect the two together. A POSITA seeking to implement Markel's device would look to Mill's disclosure for ways to internally connect the electrodes of Markel to internal electronic components using pads. Thus, a POSITA would utilize the leaf spring 62 taught by

Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel. EX1003, ¶86.

Once incorporated into the internal components of Markel, the leaf spring 62 of Mills would be embedded in the housing of Markel because its top pad portion is placed underneath an exterior surface material and against an inner wall of the exterior surface material. A POSITA would have an expectation of success in the combination as it is a mere rearrangement of known mechanical components in known ways in a complementary device. A POSITA would be led to the claimed invention based on the teachings of Markel and Mills. EX1003, ¶87.

ii. Limitation 1[b(ii)]: "an exterior surface of the enclosure comprises an exterior surface of the first portion"

As is shown in Fig. 4 of Markel illustrated below, the pad at region 410b is a first portion of the exterior surface of the enclosure of device 400. EX1005, Fig. 4, [0037]. Markel explains that "first and second electrodes may be disposed on a main body portion 110 of the MCD 100" and "an electrode (or all electrodes) or other sensor may be substantially concealed (or hidden) from a user …. an electrode may comprise molded conductive plastic with little or no visible indication of the electrode presence." EX1005, [0040], [0045]; EX1003, ¶82.

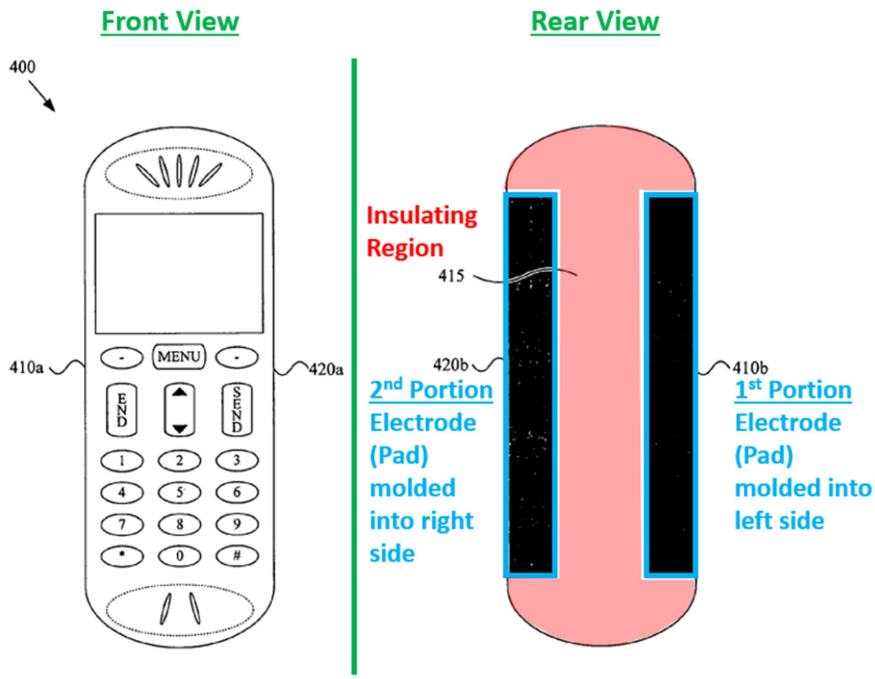


Figure 4

iii. Limitation 1[b(iii)]: "the first pad is positioned underneath the exterior surface of the first portion"

The combined device of Markel and Mills as discussed above would include the pad of leaf spring 62 positioned underneath the electrodes/first portion 410b exterior surface of Markel. Accordingly, this limitation would have been obvious in view of Markel and Mills. EX1003, ¶¶85-86.

iv. Limitation 1[b(iv)]: "the first pad detects a first electrical signal of the user's cardiac signal via the user's skin's contact with the exterior surface of the first portion"

Markel discloses electrode 410b detects and acquires various cardiac signals from a user's skin contact with the electrode 410b on the exterior of Markel's housing. EX1005, [0058]. Markel further discloses that the electrodes can detect

cardiac activity of a user "that is conductively coupled to the electrodes (*e.g.*, by touching the electrodes)." *Id.*, [0035], [0068]. Using the leaf spring of Mills as discussed above, the electrical signal is then carried from the electrode 410b through the leaf spring via the leaf spring's top pad to a printed circuit board (PCB), such as PCB 50 of Mills and ultimately to a microcontroller chip, such as microcontroller chip 42 of Mills or the equivalent processing arrangement disclosed by Markel. EX1006, 4:55-60, 4:68-5:3; EX1005, [0178]-[0179]. Accordingly, this limitation would have been obvious in view of Markel and Mills. EX1003, ¶¶83-87.

v. Limitation 1[b(v)]: "a second lead comprises a second pad that is embedded in a second portion of the enclosure"

Markel discloses a second electrode pad 420b forming a second portion of the enclosure. EX1005, [0045]. Markel states that a second electrode may be molded into the region 420b, which includes conductive plastic. *Id.*; EX1003, ¶88. Accordingly, region 420b forms a second pad.

Alternatively, as discussed above with regard to limitation 1[b(i)], Mills provides details of internal connections including the use of a leaf spring with a top pad portion. As discussed above, a POSITA would have found it obvious to use the leaf spring of Mills to connect the electrode region 420b of Markel to internal processing arrangements. EX1003, ¶88.

vi. Limitation 1[b(vi)]: "the second pad is configured to detect a second electrical signal of the user's cardiac

signal via the user's skin's contact with at least one of the second pad and the second portion of the enclosure"

Markel discloses the electrode in region 420b detects and acquires various cardiac signals from a user. EX1005, [0058]. Markel further discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." *Id.*, [0035], [0068]; *see also, Id.* at [0049] (contact electrodes with hands or fingers). Using the leaf spring of Mills as discussed above, the electrical signal is then carried from the electrode 420b through the leaf spring via the leaf spring's top pad to a printed circuit board (PCB), such as PCB 50 of Mills and ultimately to a microcontroller chip, such as microcontroller chip 42 of Mills. EX1006, 4:55-60, 4:68-5:3. Accordingly, this limitation would have been obvious in view of Markel and Mills. EX1003, ¶89.

a. Limitation 1[c]: "a processor coupled to the heart sensor to receive and process the detected cardiac signal wherein the first lead further comprises a first connector coupled to the first pad and configured to provide the first electrical signal detected by the first pad to the processor, and wherein the second lead further comprises a second connector coupled to the second pad and configured to provide the second electrical signal detected by the second pad to the processor"

Markel discloses "electronic devices" with "cardiovascular monitoring capability" that may "comprise a cardiac sensor (e.g., electrodes)" that may also "acquire, analyze and/or communicate user health-related information" such as derived from electrodes. EX1005, Abstract. A POSITA would understand from this

disclosure that Markel teaches a processor (e.g., elements that acquire, analyze, and/or communicate heart sensor information) coupled to a heart sensor. Markel discloses the processor can be any of a number of hardware components including an integrated circuit, processor chip and controller chip. EX1005, [0178]; EX1003, ¶90.

Markel discloses a first and second lead configured as a first and second pad, respectively, on a portion of the exterior housing, and the first and second pads each connected to a processor, as shown in annotated Figs. 4 and 20[5] below. EX1005, Figs. 4 and 20. Accordingly, Markel teaches a first lead with a first connector coupled to a first pad that provides a first electrical signal from the first pad to the processor, and a second lead with a second connector coupled to a second pad that provides a second electrical signal from the second pad to the processor. EX1003, ¶91.

[5] Markel Fig. 20 is a block diagram applicable to any of Markel's Figs. 1-19. EX1005, [0108].

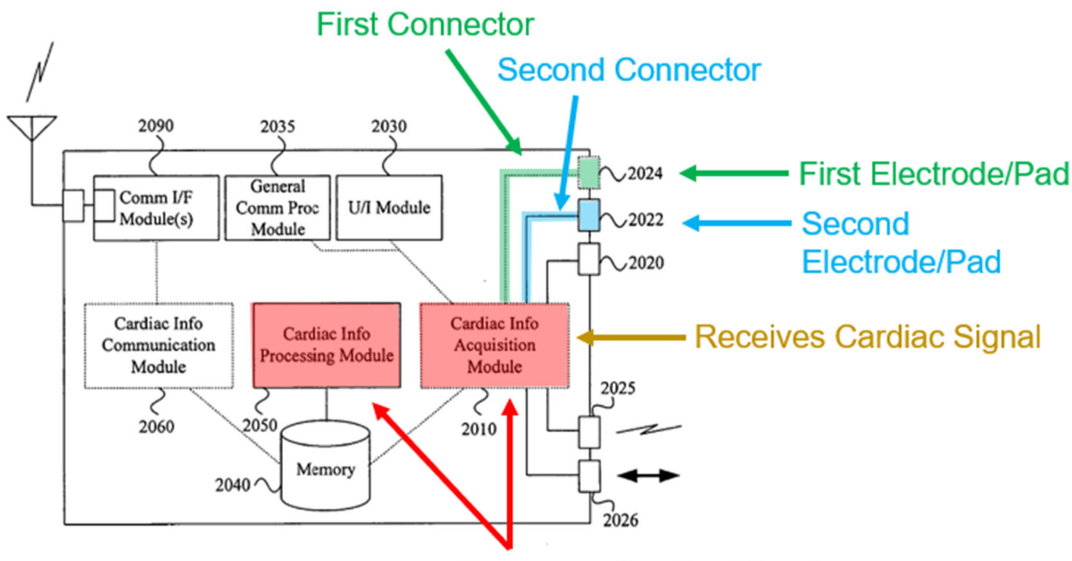
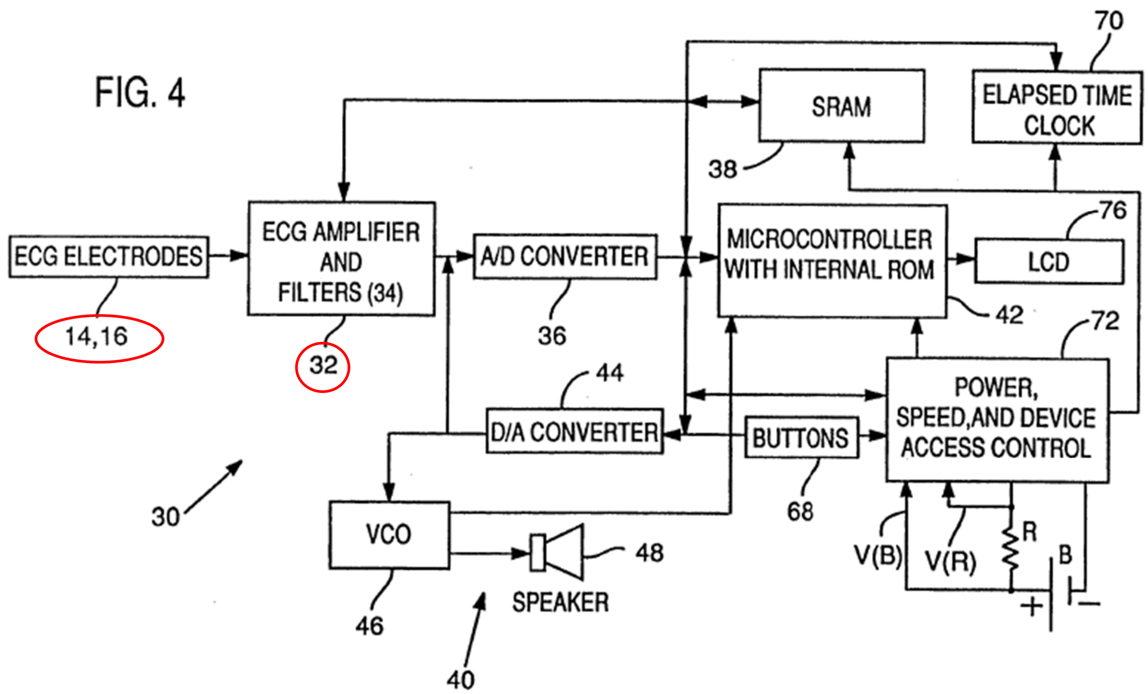


Figure 20

Mills also discloses its electrodes 14 and 16 are electrically connected to processing circuitry (ECG amplifier 32), as shown in annotated Fig. 4 below. EX1006, 4:64-5:3, Fig. 4. As an alternative to the processing disclosed in Markel, it would have been obvious to use the internal componentry of Mills as a substitute as Mills provides more specific implementation details missing from Markel. EX1003, ¶92.

FIG. 4



b. Claim 1 conclusion

For the reasons set forth above, claim 1 is obvious in view of Markel and Mills.

2. Claim 2: "the first portion and the second portion are located on opposite sides of the electronic device"

Markel discloses a first portion having a first electrode on an opposite side of an electronic device as a second portion having a second electrode. For example, Markel discloses in Fig. 4 region 420b (*first portion*) and region 410b (*second portion*) are on opposite sides of the device. EX1003, ¶94.

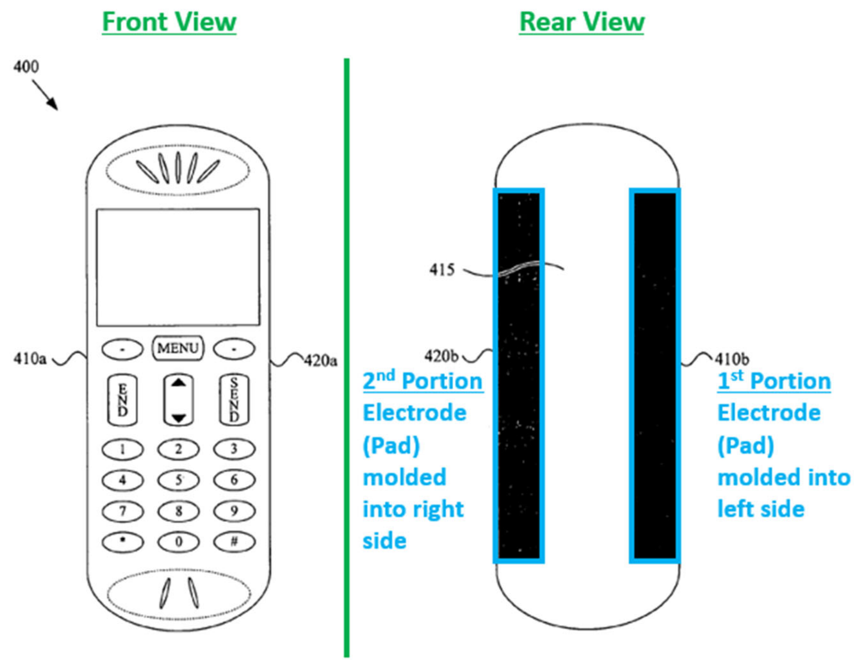


Figure 4

Region 410b is disposed on a left side of the main body portion of the device 400 and region 420b is disposed on a right side of the main body portion of the MCD 400. EX1003, ¶94.

Alternatively, Markel's Fig. 5 (below) discloses an MCD 500 with a first electrode 510 positioned on a send button (*first portion*) on a front side, and a second electrode disposed on the opposite back side 520 (*second portion*) of the MCD 500. EX1005, [0046]; EX1003, ¶95.

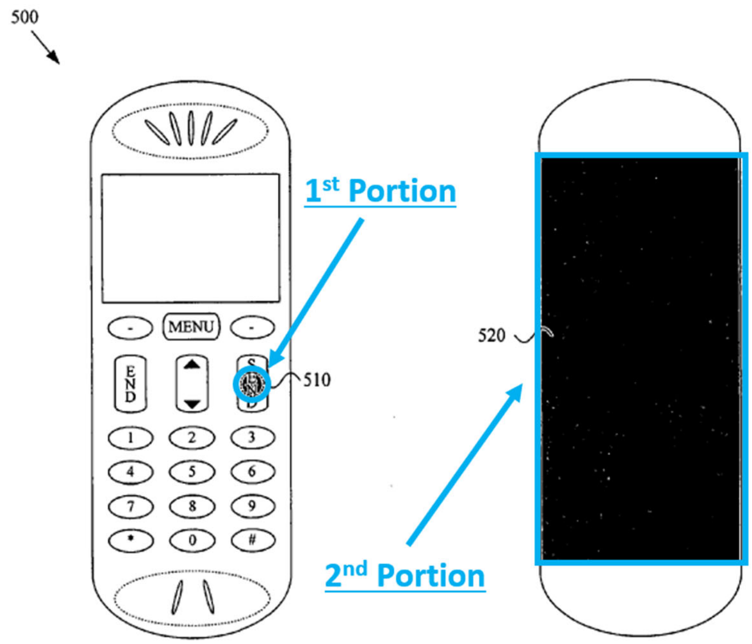


Figure 5

3. Claim 3: "wherein the first portion is electrically isolated from the second portion"

Markel discloses region 410b (*first portion*) and the region 420b (*second portion*) may include conductive plastic. EX1005, [0045]. Markel further discloses an insulating region 415 that electrically isolates the region 410b from the region 420b, as shown in Fig. 4 below. *Id.*; EX1003, ¶96.

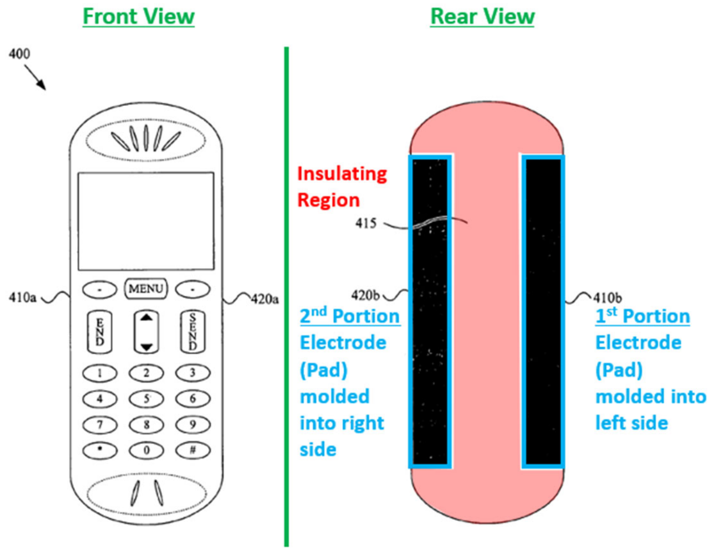


Figure 4

4. **Claim 4: "the first portion is separated from the second portion by a third portion of the enclosure; at least the third portion is constructed from a material having a first conductivity; and the first conductivity is insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion"**

As discussed above with regard to Claim 3, Markel discloses region 410b (*first portion*) and the region 420b (*second portion*) are separated by insulating region 415. A POSITA would have understood that an insulating region, such as the insulating region discussed above in Markel, is a third portion formed of a material having a first conductivity insufficient to transmit the first electrical signal from the first pad to the second pad via the third portion. EX1003, ¶97.

5. **Claim 8: "the enclosure further comprises at least one pocket underneath the exterior surface of the enclosure; and at least one**

of the first pad and the second pad is placed within the at least one pocket"

A POSITA would understand that Markel's housing encloses an interior housing space forming a pocket (compartment, hollow or cavity) underneath the exterior surface of the enclosure. EX1005, [0064], Figs. 1 and 4-5. The interior space is a pocket. As discussed above, the leaf spring 62 in the combined Markel/Mills device would be positioned within this pocket created by the housing of Markel. EX1003, ¶98.

6. Claim 9: "a display, wherein the enclosure supports the display, and wherein at least a portion of the exterior surface of the enclosure forms at least a portion of an exterior surface of the electronic device behind the display and a third lead embedded with the display, wherein the third lead is configured to detect a third electrical signal of the user's cardiac signal via the user's contact with at least one of the third lead and the display"

Fig. 1 of Markel discloses that the enclosure or housing of device 100 supports a display 140. EX1005 at Fig. 1, [0034]; EX1003, ¶99.

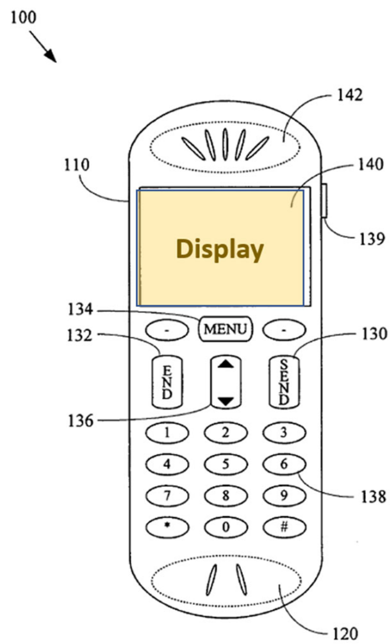


Figure 1

Further, Markel discloses that an electrode may be integrated or embedded into the touch screen of display 140. EX1005, [0044], [0078]. The electrodes of Markel are "cardiac sensor[s] (e.g., one or more electrodes) … adapted to detect cardiac activity of a user." *Id.*, [0035]. An electrode incorporated into the display is shown in Fig. 15. *Id.*, Fig. 15; EX1003, ¶99.

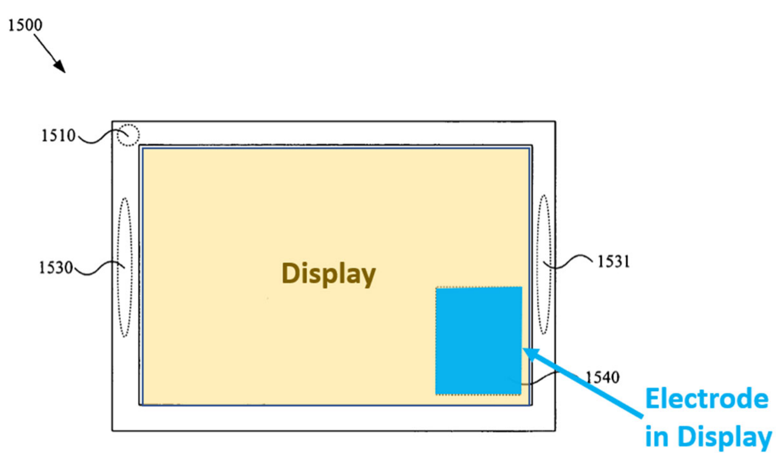


Figure 15

7. Claim 10: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second portion of the enclosure"

Markel discloses an example of MCD (device) 400 in annotated Fig. 4 below. EX1005, Fig. 4. The device has electrodes for detecting cardiac signals that "may be disposed in any of a variety of locations." EX1005, [0045], [0040]. Such electrodes may be "exposed for user contact." *Id.*, [0037]; EX1003, ¶100.

Markel discloses a second electrode "placed on or molded into region 420*b*." EX1005, [0045]. A POSITA would understand from this disclosure that Markel describes a second pad formed of conductive plastic embedded in a second portion of the enclosure. *Id.*; EX1003, ¶101.

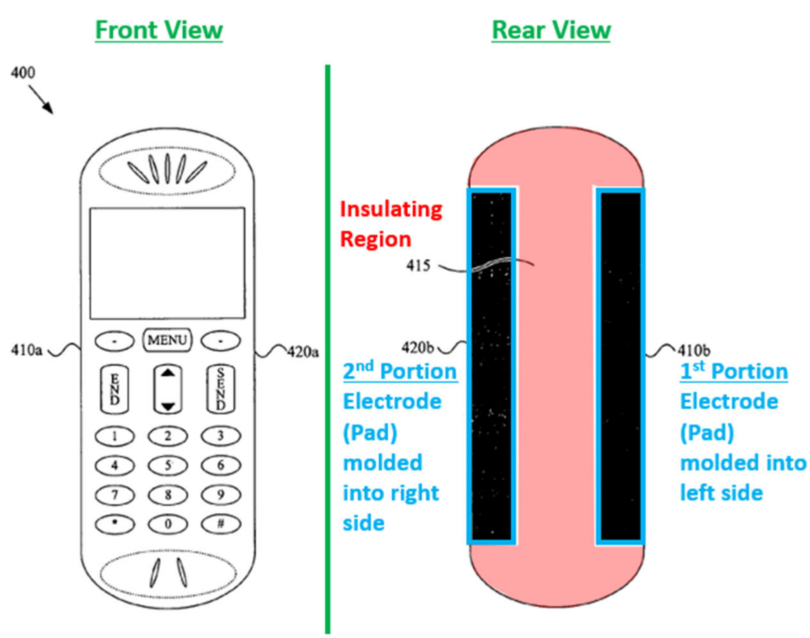


Figure 4

Markel further discloses, as shown in annotated Fig. 10 below, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a second lead on the exterior surface of an enclosure whereby the electrode detects an electrical signal of the user's cardiac signal from the user's contact with the second portion of the enclosure. EX1003, ¶102.

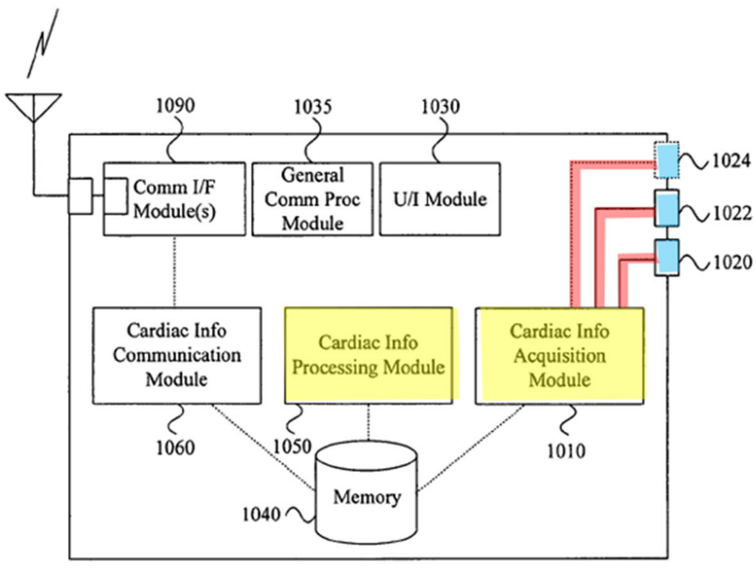


Figure 10

8. Claim 11: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second lead"

As discussed above in Claim 11, the second portion of the enclosure may also be a second lead. A POSITA would understand from this disclosure that Markel

teaches a second lead on the exterior surface of an enclosure whereby the electrode detects an electrical signal of the user's cardiac signal from the user's contact with the second lead. EX1003, ¶103.

9. Claim 12: "wherein the first portion of the enclosure is a bezel"

104. Markel discloses that the MCD 100 may include a display 140. EX1005, [0034]. Markel further goes on to state that an electrode may be disposed on a border of the display (*i.e.*, bezel). EX1005, [0044]. Markel provides an example of a display with electrodes on a border of the display in Fig. 15 (shown below with annotations). EX1005, [0078], Fig. 15. EX1003, ¶104.

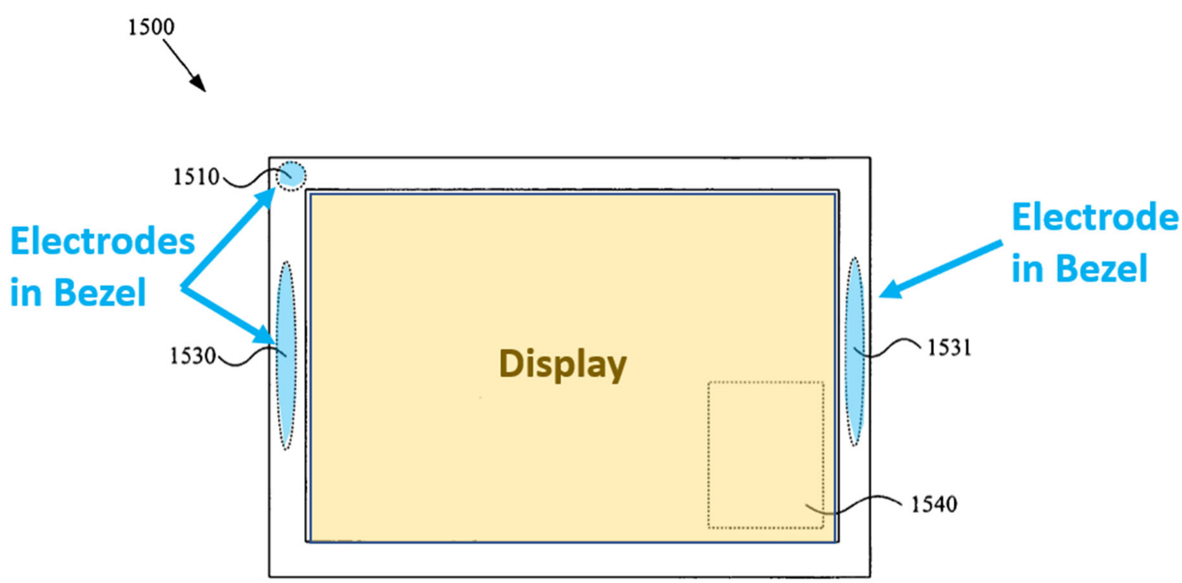


Figure 15

10. Claim 13: "wherein the second portion of the enclosure is a bezel"

Markel discloses that the MCD 100 may include a display 140. EX1005, [0034]. Markel further discloses an electrode may be disposed on a border of the display (*i.e.*, bezel). EX1005, [0044]; *see also* EX1005 at [0078] ("The display device 1500 may, for example, comprise an electrode 1510 on a border portion of the display device 1500"). EX1003, ¶105.

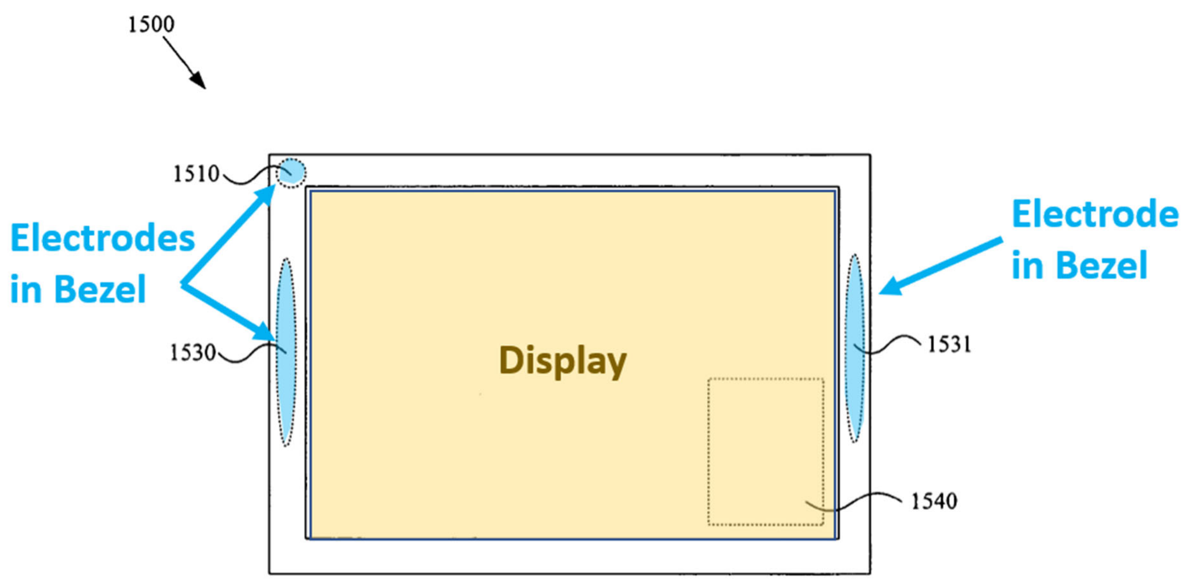


Figure 15

11. Claim 14: "wherein an interior surface of the enclosure comprises an interior surface of the first portion, wherein the first pad is positioned on the interior surface of the first portion"

As discussed previously, Markel discloses that the first electrode or first lead may be molded into the region 410b, which includes the embedded conductive plastic discussed above. EX1005, [0045]. Further, Markel as modified by Mills

places Mills' leaf spring inside Markel's device. Accordingly, Markel in combination with Mills as discussed above with respect to Claim 1 includes an interior surface with the first pad (leaf spring 62 of Mills) positioned on the interior surface of the first portion (region 410b of Markel). EX1003, ¶¶106-109.

12. Claim 15: "An electronic device for detecting a user's cardiac signal, comprising:

Markel discloses a "mobile communication device, general-purpose computer user interface device, and other . . . electronic devices with cardiovascular monitoring capability." *See* EX1005, Abstract, [0035]; EX1003, ¶110.

a. Limitation 15[a]: "an enclosure"

Fig. 1 of Markel discloses that the mobile communication device (MCD) 100 includes a main body portion 110 as shown, for example, in Fig. 1 (reproduced below).

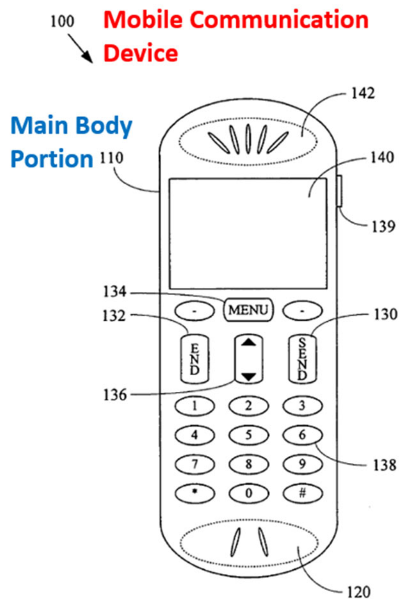


Figure 1

According to Markel, the main body portion 110 "may comprise the portion of the MCD 100 that is generally held in the hand during normal use of the MCD 100" and the device may comprise a "casing or housing." EX1005, [0043], [0064]; EX1003, ¶111.

b. Limitation 15[b]: A display screen exposed to the user through an opening in the enclosure:

Markel discloses that the device 100 comprises various user output features such as "a display 140 (which may also function as a touch screen input feature)." EX1005, [0034]. As shown in Fig. 1, the display 140 is shown visibly on the device 100 within the main body portion 110 of the device 100. As such, a POSITA would consider the main body portion 110 to have an opening in the main body portion 110 to accommodate the display 140. EX1003, ¶112.

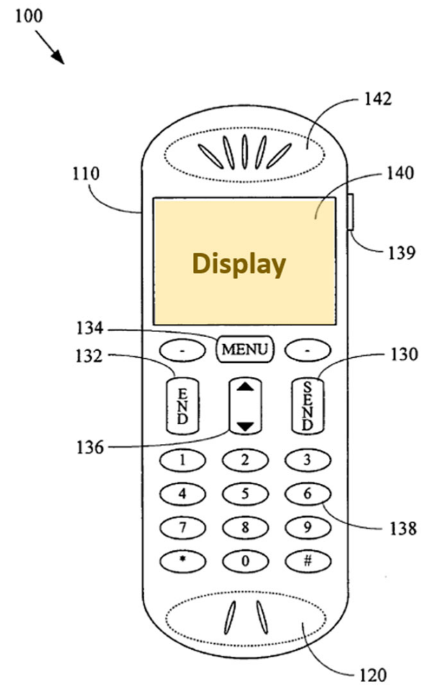


Figure 1

i. Limitation 15[c]: "a heart sensor configured to detect the user's cardiac signal"

Markel discloses the device 100 may comprise at least one cardiac sensor "that is adapted to detect cardiac activity of a user" and which is a type of heart sensor that detects a cardiac signal. EX1005, [0035], [0058], [0082], [0103]; EX1003, ¶113.

ii. Limitation 15[c(i)]: "the heart sensor comprising: a first lead embedded in a first portion of the enclosure of the electronic device"

Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure. Markel discloses electrodes for detecting the cardiac signals "may be disposed in any of a variety of locations" on its device including being "generally … [or] substantially concealed (or hidden) from a user. EX1005, [0045],

[0039]-[0040]. Such electrodes may be "exposed for user contact" or "may be integrated into various molded components." *Id.*, [0037]; EX1003, ¶114.

Markel discloses an example of MCD (device) 400 in Fig. 4. EX1005, [0045]. Markel discloses a first electrode "placed on or molded into region 410*b*." *Id.* Accordingly, Markel describes a first pad formed of conductive plastic embedded in a first portion of the enclosure. *Id.*; EX1003, ¶115.

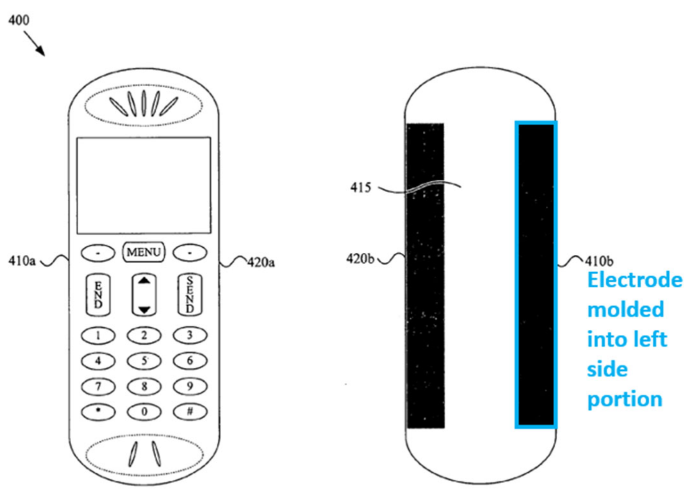


Figure 4

Alternatively, Fig. 5 of Markel discloses "a first electrode 510 positioned on a send button, and a second electrode disposed on the back 520 of the mobile communication device 500." EX1005, Fig. 5, [0046]. Both of these electrodes are shown as being pad shaped. As explained above, a "lead" is defined as an "electrode."

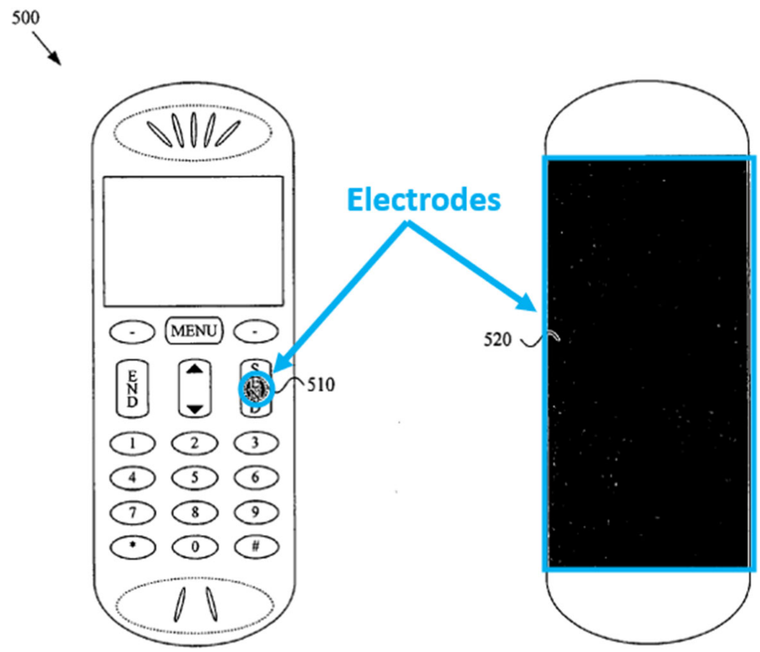


Figure 5

Markel discloses a first pad embedded in a first portion of an enclosure with a connector coupling it to a processor as shown in annotated Fig. 20 below. A POSITA would understand this to be a first lead embedded in a first portion because it couples a body signal at the electrode to processing circuitry. EX1003, ¶116.

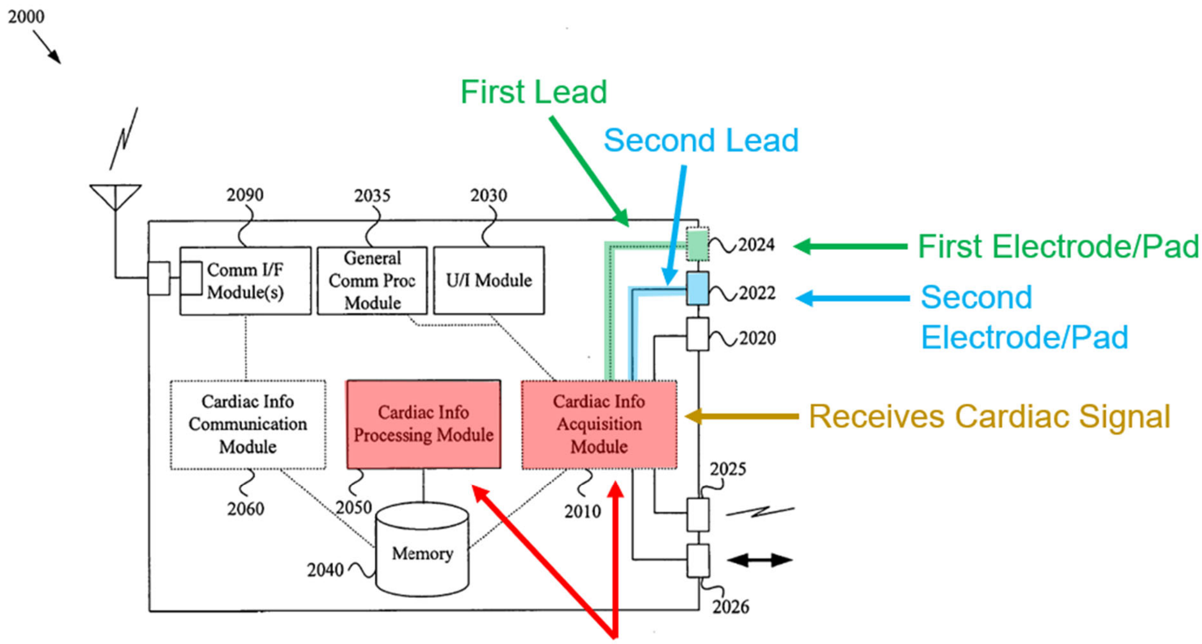
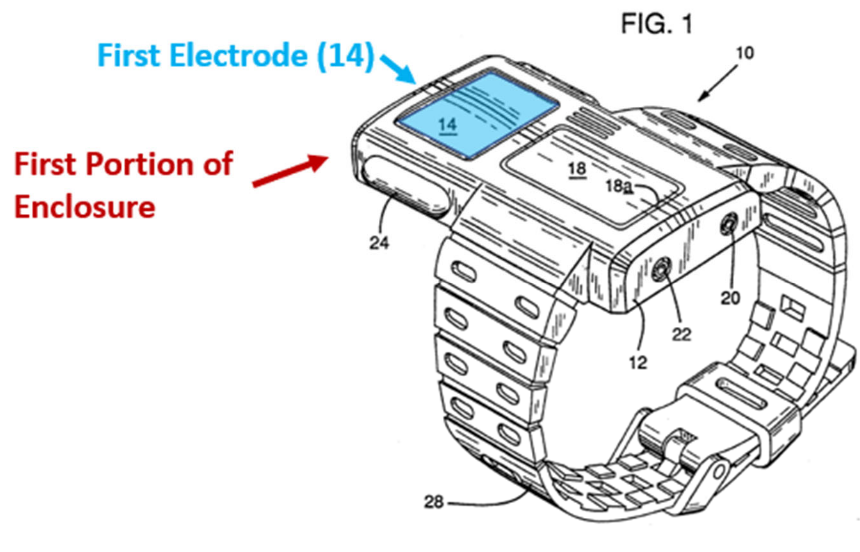


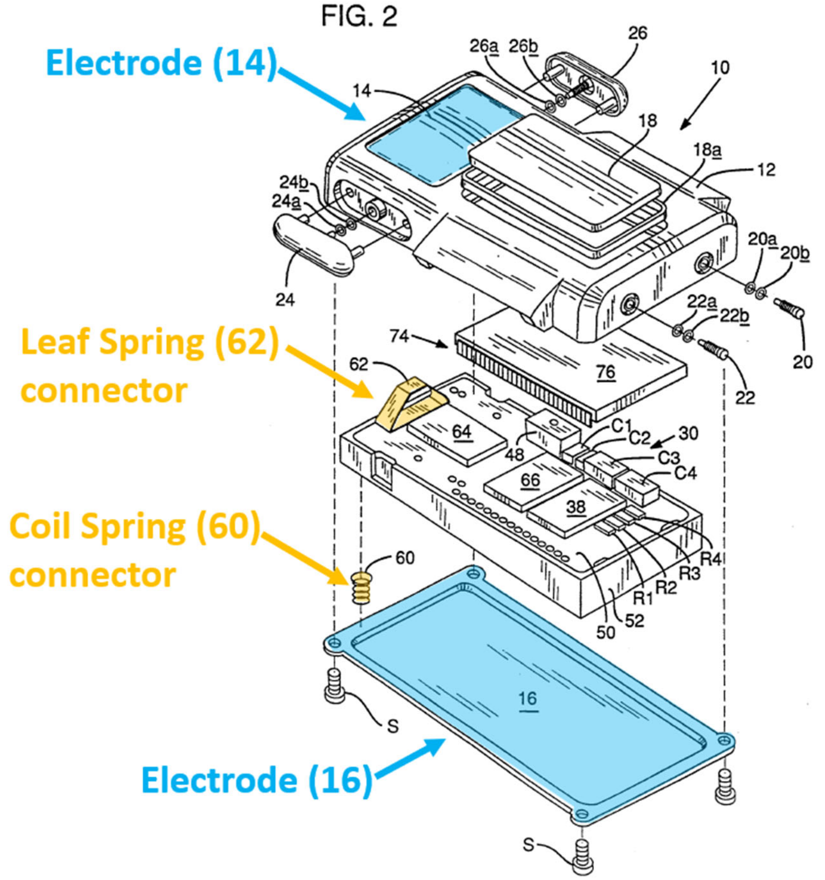
Figure 20

Markel does not provide details of the internal components of its device. A POSITA looking to implement Markel would have looked to other references in the same field of disclosure for information on internal components and structures to make the device of Markel. Mills, which discloses a similar device, discloses an enclosure (housing 12) which includes a first electrode 14. EX1006, Fig. 1 (shown below), 3:8-9. Mill's electrodes are similar to Markel's electrodes 410b, 420b. EX1003, ¶117.

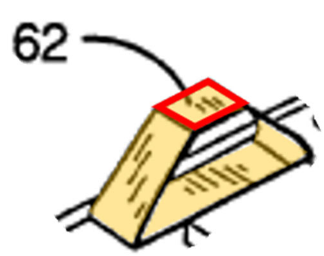


Mills further specifies that the electrode 14 forms an integral part of the housing 12 by being molded therein, again similar to Markel's disclosure. EX1006, 3:47-51. Mills further discloses electrode 14 is physically and electrically connected to processing circuitry by a leaf spring 62 as shown in Fig. 2 (reproduced below with annotations). *Id.*, 4:67-5:3; *See also Id.*, 4:1-3; EX1003, ¶117.

FIG. 2



Mills teaches that "electrode 14 is connected to the … signal input terminal of ECG amplifier 32 via a generally trapezoid-shaped, split and thus slidably yielding, leaf spring 62 connected to a circuit pad formed on the top side of PCB 50." EX1006, 4:67-5:3. The top of the trapezoid-shaped leaf spring 62 is a pad.



The pad is pressed against the inner wall of electrode 14 in Mills and surrounded by the housing 12 of Mills and is therefore embedded in the device of Mills. Accordingly, leaf spring 62 is a pad that would be embedded in the enclosure of device of Mills. The pad is underneath the exterior surface and the pad is configured to detect an ECG signal of the user via its contact with electrode 14 located on the exterior surface. EX1003, ¶¶84-85.

It would have been obvious to incorporate the pad (leaf spring 62) teachings of Mills into the device of Markel because Mills provides details of internal physical connections on which Markel is silent. Markel teaches that "electrodes may be incorporated into the MCD 100 in any of a variety of manners," which would include using a pad underneath the exterior surface. EX1005, [0035]. Leaf springs are well known electrical connectors commonly used in the art. Leaf springs are commonly employed as electrical connectors because they provide good electromechanical contact between two components. Leaf springs are often placed between two components as an electrical connector (or bridge) and mechanical pressure is applied such that the leaf spring pushes against both components to maintain good contact pressure. Leaf springs are commonly used because they solve manufacturing and assembling complexities by, for example, eliminating the need to solder a wire between the electrode and a circuit board to electrically connect the two together. A POSITA seeking to implement Markel's device would look to Mill's disclosure for

ways to internally connect the electrodes of Markel to internal electronic components using pads. Thus, a POSITA would utilize the leaf spring 62 taught by Mills to connect the electrodes 410b, 420b of Markel to internal processing components taught by Markel. EX1003, ¶86, ¶118.

Once incorporated into the internal components of Markel, the leaf spring 62 of Mills would be embedded in the housing of Markel because its top pad portion is placed underneath an exterior surface material and against an inner wall of the exterior surface material. A POSITA would have an expectation of success in the combination as it is a mere rearrangement of known mechanical components in known ways in a complementary device. A POSITA would be led to the claimed invention based on the teachings of Markel and Mills. EX1003, ¶119.

iii. Limitation 15[c(ii)]: "the first lead detects a first electrical signal of the user's cardiac signal via the user's contact with at least one of the first lead and the first portion of the enclosure of the electronic device"

Markel discloses a first electrode 2024 detects and acquires various cardiac signals from a user. EX1005, [0110]. Markel further discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." *Id.*, [0035], [0068]. Markel discloses a first lead in a first portion of an enclosure as shown in annotated Figs. 4 and 20 below. A POSITA would understand from these figures that this is a lead because it couples a body

signal at the first electrode 2024 to processing circuitry 2010. Accordingly, this limitation would have been obvious in view of Markel and Mills. EX1003, ¶120.

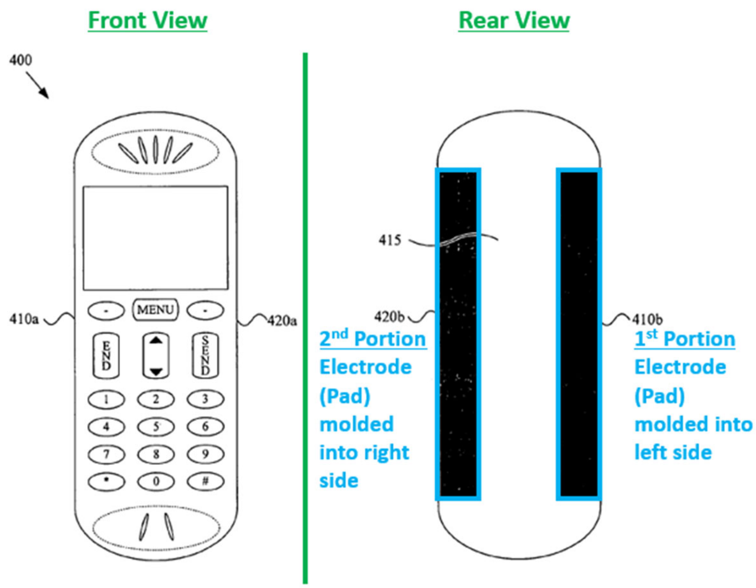


Figure 4

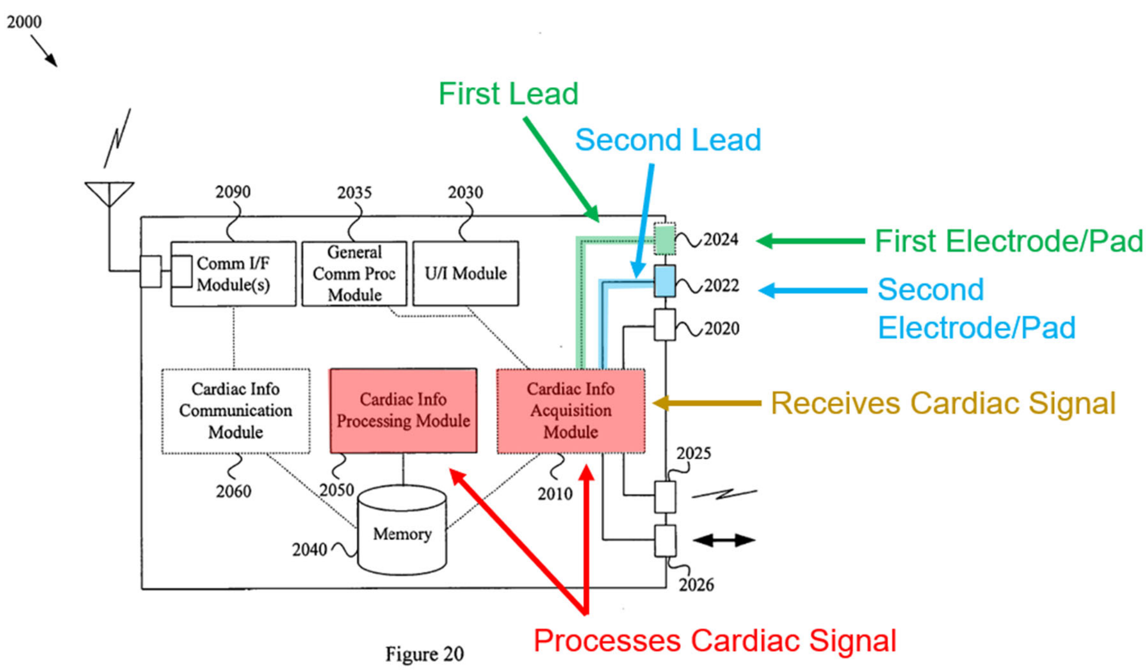


Figure 20

iv. Limitation 15[c(iii)]: A second lead embedded in the display screen of the electronic device

Fig. 1 of Markel discloses that the enclosure or housing of MCD 100 supports a display 140. EX1005, Fig. 1, [0034]; EX1003, ¶121.

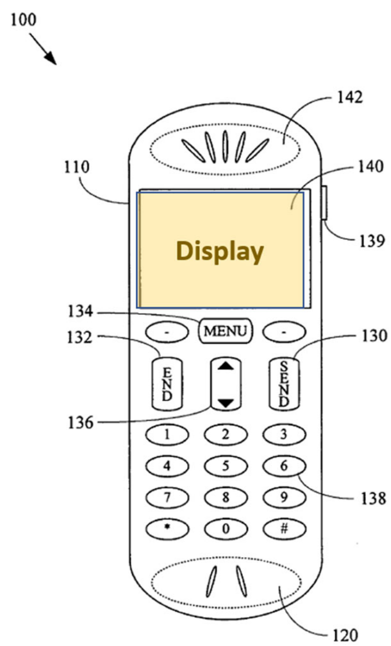


Figure 1

Further, Markel discloses that an electrode may be integrated or embedded into the touch screen of display 140. EX1005, [0044], [0074], [0078]. The electrodes of Markel are "cardiac sensor[s] (e.g., one or more electrodes) … adapted to detect cardiac activity of a user." *Id.*, [0035]. An electrode incorporated into the display is shown in Fig. 15. *Id.*, Fig. 15; EX1003, ¶121.

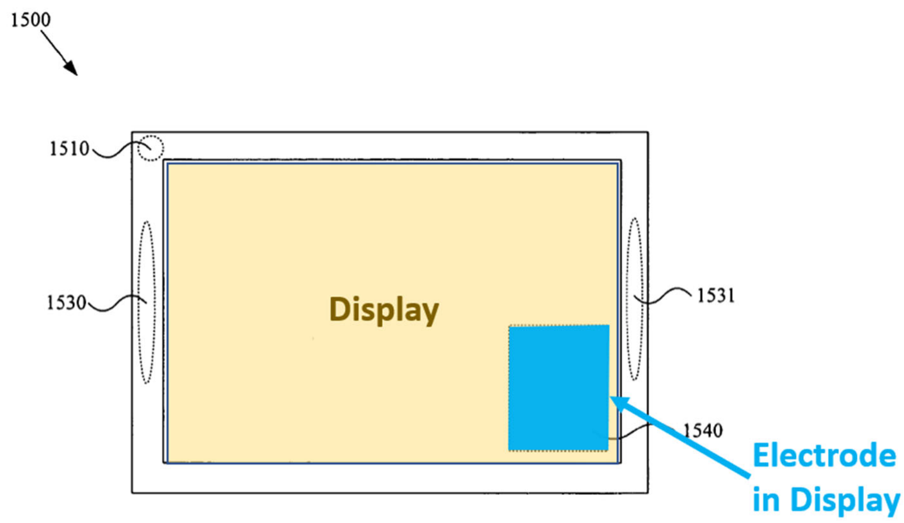


Figure 15

v. **Limitation 15[c(iv)]: "the second lead detects a second electrical signal of the user's cardiac signal via the user's contact with at least one of the second lead and the display screen of the electronic device"**

Markel discloses that an electrode is integrated or embedded into a touch screen display. EX1005, [0044], [0078]. Markel further discloses that its electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." *Id.*, [0035], [0068]; EX1003, ¶122.

c. **Limitation 15(d): "a processor coupled to the heart sensor to receive and process the detected cardiac signal"**

Markel discloses an electronic device 2000 that may "comprise a cardiac information acquisition module 2010 [and] various cardiac sensors (e.g., electrodes) 2020, 2022, 2024." EX1005, [0110]. According to Markel, such modules or sensors are utilized to acquire (receive) and process cardiac information from the user of the

electronic device. *Id.*, [0110], [0111]. As shown in annotated Fig. 20 below, the cardiac information acquisition module 2010 is coupled to the electrodes 2020, 2022, 2024 which receive and process the cardiac signals from such electrodes. *See also Id.*, [0088], [0096]; EX1003, ¶123.

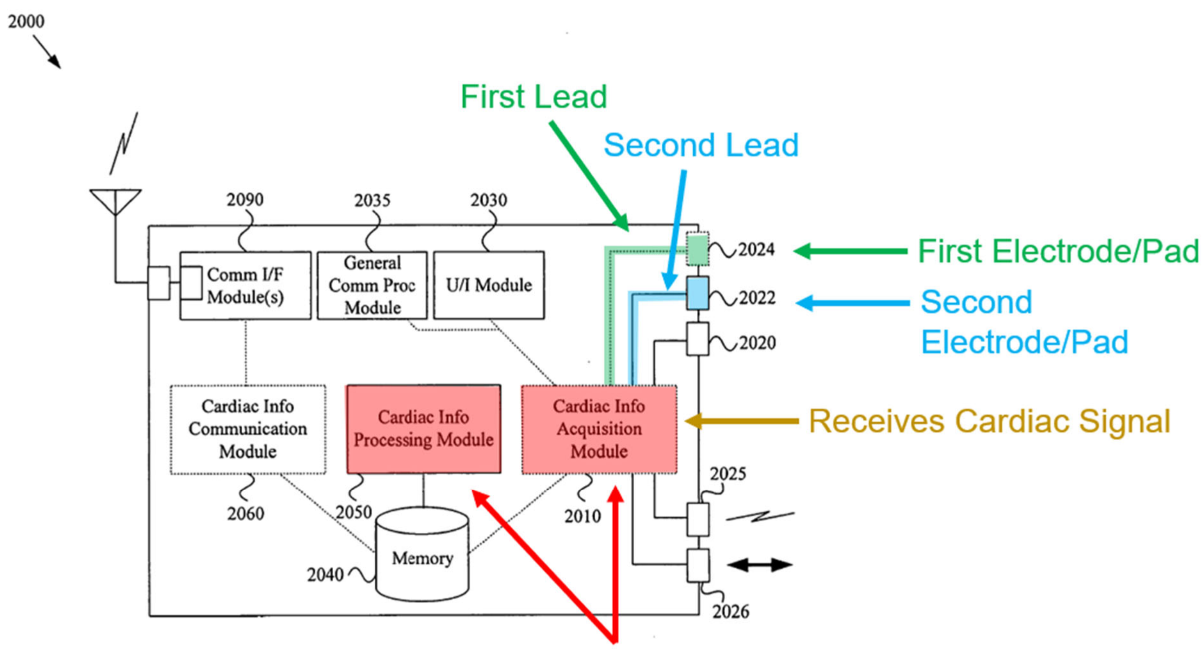


Figure 20

Mills similarly discloses that the housing 12 comprises a very-large scale integrated (VLSI) circuit chip that includes an "ECG signal and abnormal event detection circuitry, analog-to-digital (AD) and digital-to-analog (DA) conversion circuitry, memory and processor circuitry." EX1006, 2:1-8. Mills specifies that the VLSI is surface-mounted on the top side of printed circuit board (PCB) 50. *Id.*, 5:18-19. Electrodes 14 and 16 are electrically connected to the PCB 50 via a respective spring (60/62). *Id.*, 4:55-5:3. The VLSI is a processor coupled to the heart sensor

(electrodes) and is configured to receive and process the detected cardiac signal. As an alternative to the processing disclosed in Markel, it would have been obvious to use the internal componentry of Mills as a substitute as Mills provides more specific implementation details missing from Markel. EX1003, ¶124.

d. Claim 15 conclusion

For the reasons set forth above, Claim 15 is obvious in view of Markel and Mills. EX1003, ¶125.

13. Claim 16: "wherein the first lead is configured to detect the first electrical signal of the user's cardiac signal via the user's contact with the first lead"

Markel discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." EX1005, [0035], [0068]. Markel discloses, as shown in annotated Fig. 10 below, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a first lead configured to detect a first electrical signal of the user's cardiac signal from the user's contact with the first lead. EX1003, ¶126.

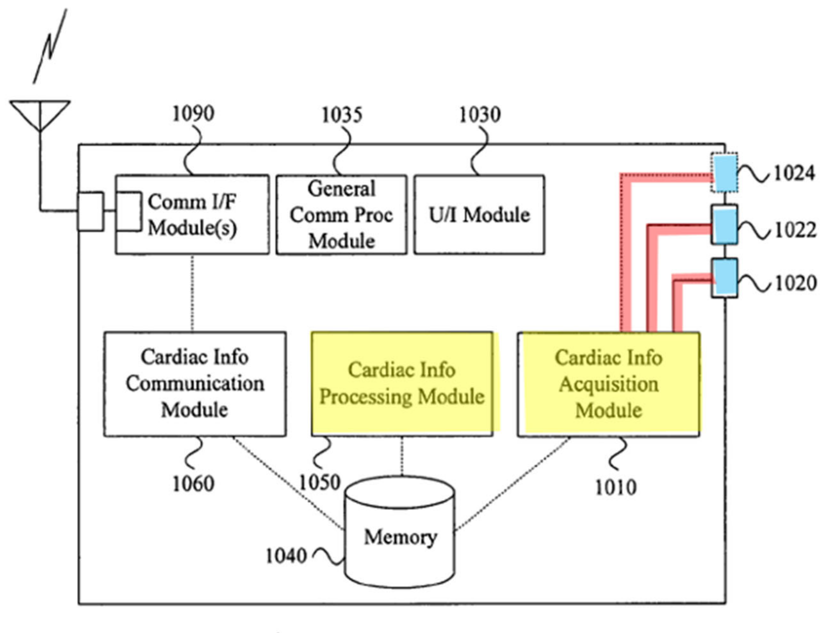


Figure 10

14. Claim 17: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second lead"

Markel discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." EX1005, [0035], [0068]. As in claim 16 above, Markel discloses, as shown in annotated Fig. 10 above, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a second lead configured to detect a second

electrical signal of the user's cardiac signal from the user's contact with the second lead. EX1003, ¶127.

15. Claim 18: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the display screen"

Markel discloses that an electrode is integrated or embedded into a touch screen display. EX1005, [0044], [0074], [0078]. Markel further discloses that its electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." *Id.*, [0035], [0068]; EX1003, ¶128.

16. Claim 19: "the first portion of the electronic device comprises a bezel of the enclosure; the electronic device further comprises a non-conductive component positioned between the bezel and the display screen for electrically isolating the first lead from the second lead"

Markel discloses that the device 100 includes a display 140. EX1005, [0034]. Markel discloses that an electrode may be disposed on a border of the display (*i.e.,* bezel). EX1005, [0044]. Markel further discloses an electrode may be disposed on a border of a display (*i.e.,* bezel) as shown in annotated Fig. 15 below. *Id.*, [0044]; *see also Id.*, [0078] ("The display device 1500 may, for example, comprise an electrode 1510 on a border portion of the display device 1500"). Markel also discloses "a first electrode 242 (e.g., a first conductive plastic region) and a second electrode 244 (e.g., a second conductive plastic region) separated by an insulating portion 243 (e.g., non-conductive plastic)." EX1005, [0047]. A POSITA would understand the

need for electrical isolation between leads the first and second lead using non-conductive materials for proper measurement of ECG signals. EX1003, ¶129.

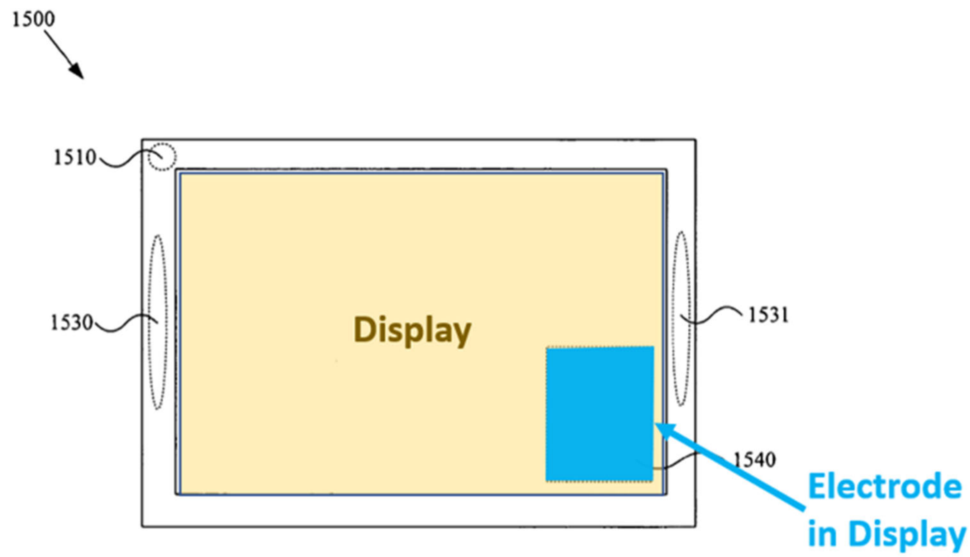


Figure 15

17. Claim 20: "wherein the first lead is configured to detect the first electrical signal of the user's cardiac signal via the user's contact with the first portion of the enclosure"

Markel discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." EX1005, [0035], [0068]. Markel also discloses a first electrode "placed on or molded into region 410*b*," a first portion of the enclosure, as shown in annotated Fig. 4 below. *Id.*, [0045], Fig 4. Markel discloses, as discussed above in claim 16 and shown above in annotated Fig. 10, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e.,

heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a first lead configured to detect a first electrical signal of the user's cardiac signal from the user's contact with the first portion of the enclosure. EX1003, ¶130.

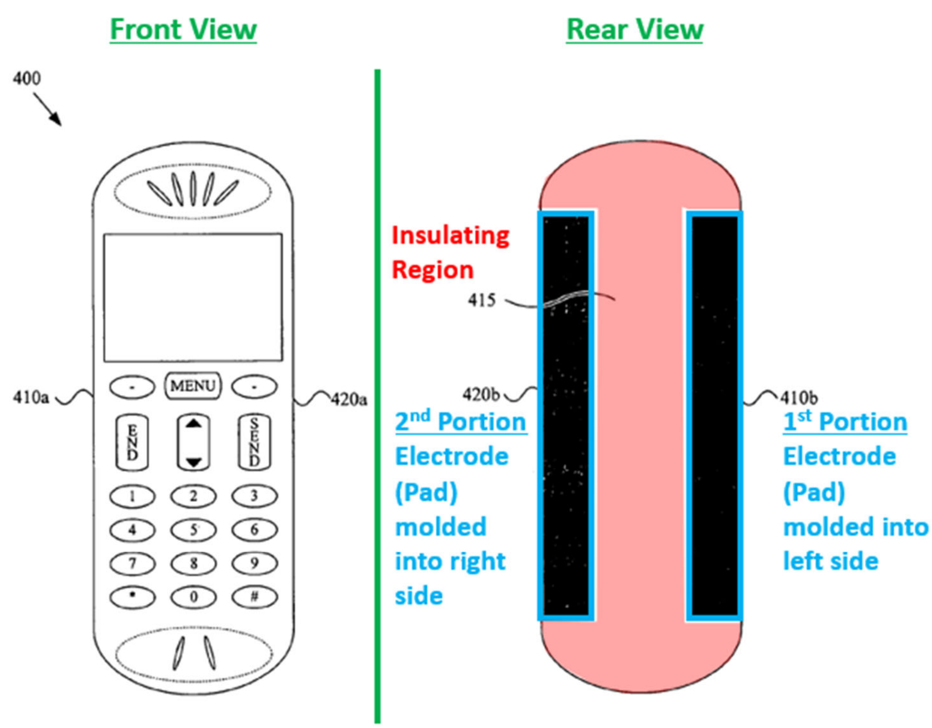


Figure 4

18. Claim 21: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the second lead"

Markel discloses that the electrodes can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." EX1005, [0035], [0068]. Markel discloses, as shown in annotated Fig. 10 below, "a cardiac information acquisition module 1010 that is coupled to the first and

second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." *Id.*, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a second lead configured to detect a second electrical signal of the user's cardiac signal from the user's contact with the second lead. EX1003, ¶131.

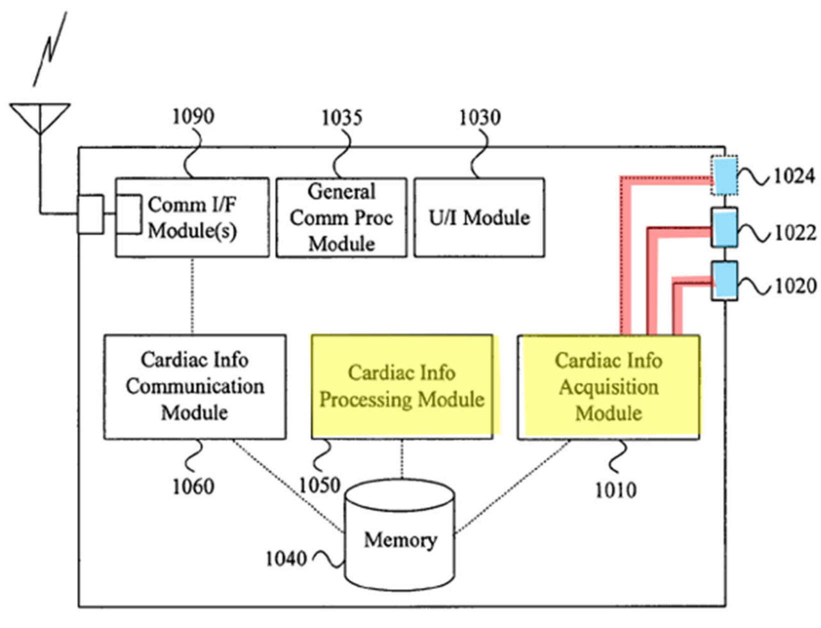


Figure 10

19. Claim 22: "wherein the second lead is configured to detect the second electrical signal of the user's cardiac signal via the user's contact with the display screen"

As discussed previously, Markel discloses that an electrode may be disposed on a video display device 140, in which the electrode is integrated into a touch screen display 140. EX1005, [0044], [0074], [0078]. Markel discloses that the electrodes

can detect cardiac activity of a user "that is conductively coupled to the electrodes (e.g., by touching the electrodes)." *Id.*, [0035], [0068]. Markel discloses, as shown in annotated Fig. 10 above, "a cardiac information acquisition module 1010 that is coupled to the first and second electrodes 1020, 1022 and utilizes the first and second electrodes 1020, 1022 to detect and acquire various cardiac (i.e., heart-related) signals from a user." EX1005, [0058], Fig. 10. A POSITA would understand from this disclosure that Markel teaches a second lead configured to detect a second electrical signal of the user's cardiac signal from the user's contact with the display screen. EX1003, ¶132.

V. SECONDARY CONSIDERATIONS

Secondary considerations should be considered but do not control an obviousness conclusion, particularly where, as here, a strong *prima facie* showing of obviousness exists. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). Petitioner is unaware of evidence of secondary considerations, and any such evidence could not outweigh the strong *prima facie* case of obviousness. Petitioner reserves the right to respond to any evidence of secondary considerations.

VI. DISCRETIONARY FACTORS FAVOR INSTITUTION

With respect to 35 U.S.C. § 314(a), *Fintiv* factors 2, 3, 4, and 6 strongly favor institution of this IPR, and factors 1 and 5 are neutral. Regarding factor 2, the final

written decision in this IPR is expected long before trial in the Delaware Litigation. Apple filed its complaint in the Delaware Litigation less than five months ago, on October 20, 2022, and the most recent published statistics indicate that the median time to trial for a civil action in the District of Delaware is almost three years. EX1021.

For factor 3, the parties and the court have made little investment in the Delaware Litigation. No discovery or infringement or invalidity contentions have been exchanged and claim construction briefing has not started.

For factor 4, Petitioner stipulates that, if the Board institutes this IPR, Petitioner will not pursue, in the Delaware Litigation, the specific invalidity grounds for the challenged claims raised in this Petition or that reasonably could have been raised in this Petition. This stipulation "mitigates any concerns of duplicative efforts between the district court and the Board," and, thus, factor 4 "weighs strongly in favor of not exercising discretion to deny institution." *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential as to § II.A).

For factor 6, this Petition presents a compelling case of unpatentability of the challenged claims. For factor 1, Petitioner has not moved for a stay of the Delaware Litigation but may do so upon institution of this IPR. For factor 5, Petitioner Masimo is a defendant in the Delaware Litigation. In view of all circumstances, the

judicial and administrative efficiency considerations underlying *Fintiv* are not implicated here. Therefore, the Board should institute this IPR.

With respect to 35 U.S.C. § 325(d), this Petition presents the first *inter partes* challenge to the ’257 patent and none of the references the Petition relies on were considered during examination. Further, the references presented herein are materially better than the references considered during examination.

VII. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1-4 and 8-22 of the ’257 patent.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: March 22, 2023

By: /Jarom Kesler/
Jarom Kesler (Reg. No. 57,046)
Customer No. 20,995
Attorneys for Petitioner
Masimo Corporation
(949) 760-0404

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,076,257**, exclusive of the parts exempted as provided in 37 C.F.R. § 42.24(a), contains 13,860 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a).

Dated: March 22, 2023 By: /Jarom Kesler/

Jarom Kesler (Reg. No. 57,046)
Customer No. 20,995
Attorneys for Petitioner
Masimo Corporation
(949) 760-0404

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. US 10,076,257** and **EXHIBITS 1001-1006, 1008, 1012-1021** are being served on March 22, 2023, via Federal Express overnight delivery on counsel of record for U.S. Patent No. US 10,076,257 as addressed below:

62579 - APPLE INC./BROWNSTEIN
c/o Brownstein Hyatt Farber Schreck, LLP
410 Seventeenth Street
Suite 2200
Denver, CO 80202

Dated: March 22, 2023 By: /Jarom Kesler/

Jarom Kesler (Reg. No. 57,046)
Customer No. 20,995
Attorneys for Petitioner
Masimo Corporation
(949) 760-0404

56970939

EXHIBIT 19

Filed on behalf of: **Masimo Corporation**
By: Philip M. Nelson (Reg. No. 62,676)
Jarom D. Kesler (Reg. No. 57,046)
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MASIMO CORPORATION,
Petitioner

v.

APPLE, INC.,
Patent Owner

Case No. IPR2023-00807
Patent No. 11,474,483

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,474,483

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TABLE OF AUTHORITIES

Page No(s).

TABLE OF AUTHORITIES
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Page No(s).

OTHER AUTHORITIES

EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,474,483 ('483 Patent)
1002	File History of the '483 Patent
1003	Declaration of Professor R. James Duckworth, Ph.D.
1004	*Curriculum Vitae* of Professor R. James Duckworth, Ph.D.
1005	PCT Publication No. WO 2005/092182 ("Kotanagi")
1006	U.S. Patent No. 6,265,789 to Honda ("Honda")
1007	U.S. Publication No. 2001/0056243 ("Ohsaki")
1008	PCT Publication No. WO 2012/140559 Al ("Shmueli")
1009	European Patent App. No. EP14163114 ("Coppola EP")
1010	U.S. Provisional Patent App. No. 61/976,388 ("Fei")
1011	PCT Publication No. WO 2015/034149 Al ("Choi PCT")
1012–1013	Reserved
1014	US 20120221254 A1 (Kateraas)
1015	Reserved
1016	US20140135594 ("Yuen")
1017–1019	Reserved
1020	PCT Patent Pub. WO 2015150199 A1 ("Coppola")
1021	Reserved
1022	U.S. Patent No. 4,129,124 ("Thalmann")
1023	Korean Patent No: 10-2136836 ("Choi")
1024	Reserved
1025	U.S. Patent No. 4,163,447 ("Orr")
1026	U.S. Patent No. 4,224,948 ("Cramer")

Exhibit No.	Description
1027	U.S. Patent No. 4,248,244 (“Charnitski”)
1028	PCT Publication No. WO 1982000088 A1 (“Steuer”)
1029	U.S. Patent No. 4,375,219 (“Schmid”)
1030	U.S. Patent No. 5,316,008 (“Suga”)
1031	U.S. Patent No. 5,738,104 (“Lo”)
1032	Reserved
1033	US 20050116820 A1 (“Goldreich”)
1034	US 20070276270 A1 (“Tran”)
1035	US 20080208009 A1 (“Shklarski”)
1036	U.S. Patent No. 6,091,530 (“Duckworth”)
1037	U.S. Patent 6,075,755 (“Zarchan”)
1038	Y. Mendelson, “A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring,” Proceedings of the 28th IEEE (2006)
1039	Y. Mendelson, “Wearable Wireless Pulse Oximetry for Physiological Monitoring,” PPL Workshop (2008)
1040	Reserved
1041	US 20150355604 A1 (“Fraser”)
1042–1046	Reserved
1047	USPTO Memo of April 5, 2018 regarding *Dynamic Drinkware* and *Amgen* cases
1048	District of Delaware Statistics, downloaded on February 21, 2023 from https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0930.2022.pdf
1049	US Patent No. 8,624,836 (“Miller”)

CLAIM LISTING

Limitation	Claim Language
1a	A wearable electronic device comprising:
1b	a housing defining a first opening and a second opening;
1c	a display positioned at least partially within the first opening;
1d	a front cover positioned over the display and defining at least a portion of a front exterior surface of the wearable electronic device;
1e	a biosensor module comprising:
1f	a rear cover positioned at least partially within the second opening and defining an optically transparent window;
1g	and a protruding convex surface;
1h	an optical sensor aligned with the optically transparent window;
1i	a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode positioned along the rear surface of the wearable electronic device; and
1j	a third electrode positioned along a side of the wearable electronic device, wherein:
1k	the wearable electronic device is configured to measure a first physiological parameter of a wearer using the optical sensor; and
1l	the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.
2a	The wearable electronic device of claim 1, wherein: the wearable electronic device further includes a watch band coupled to the housing and configured to couple the wearable electronic device to a wearer;

Limitation	Claim Language
2b	the optical sensor is a heart-rate sensor;
2c	the first electrode is an electrode of an electrocardiograph sensing system; and
2d	the second physiological parameter is an electrocardiogram.
3	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
4	The wearable electronic device of claim 1, wherein the second physiological parameter is a galvanic skin response.
5	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
6	The wearable electronic device of claim 1, wherein the optical sensor comprises: an optical emitter configured to emit an optical signal; and an optical receiver configured to receive a reflected portion of the optical signal.
7	The wearable electronic device of claim 6, wherein: the optical emitter is a first optical emitter configured to emit light having a first wavelength; and the optical sensor further comprises a second optical emitter configured to emit light having a second wavelength different from the first wavelength.
8	The wearable electronic device of claim 1, further comprising an input device positioned along a side of the housing and configured to receive a rotational input and a translational input.
9	The wearable electronic device of claim 1, further comprising a wireless charging system configured to receive power wirelessly, from an external charging dock, through the rear exterior surface of the wearable electronic device.

Limitation	Claim Language
10a	An electronic watch comprising:
10b	a display;
10c	a housing at least partially enclosing the display;
10d	a front cover positioned over the display and defining at least a portion of a front exterior surface of the electronic watch;
10e	a biosensor module defining at least a portion of a rear exterior surface of the electronic watch opposite the front exterior surface, the biosensor module comprising:
10f	a rear cover defining an optically transparent window;
10g	an optical sensor positioned below the optically transparent window;
10h	a first electrode positioned along the rear exterior surface of the electronic watch; and a second electrode positioned along the rear exterior surface of the electronic watch; and
10i	a third electrode positioned along a side of the electronic watch, wherein:
10j	the electronic watch is configured to measure a first physiological parameter of a wearer using the optical sensor; and
10k	the electronic watch is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.
11	The electronic watch of claim 10, wherein the rear cover defines a convex exterior surface.
12	The electronic watch of claim 11, wherein the optically transparent window is located within a portion of the rear cover that defines the convex exterior surface.

Limitation	Claim Language
13	The electronic watch of claim 10, wherein the first electrode, the second electrode, and the third electrode are part of an electrocardiograph sensing system.
14	The electronic watch of claim 10, wherein the first physiological parameter is a heart rate.
15	The electronic watch of claim 10, wherein the rear cover comprises sapphire.
16a	A wearable electronic device comprising: a housing; a band attached to the housing and configured to couple the wearable electronic device to a user;
16b	a touch-sensitive display positioned at least partially within the housing;
16c	a rear cover positioned at least partially within a rear opening defined along a rear portion of the housing, the rear cover defining at least a portion of a rear exterior surface of the wearable electronic device and having an optically transparent portion;
16d	an optical sensor positioned within the housing and configured to emit an optical signal through the optically transparent portion;
16e	a first electrode positioned along the rear exterior surface of the wearable electronic device; a second electrode positioned along the rear exterior surface of the wearable electronic device; and
16f	a third electrode positioned along a side of the wearable electronic device, wherein:
16g	the wearable electronic device is configured to measure a first physiological parameter using the optical sensor; and
16h	the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode.

Limitation	Claim Language
17	The wearable electronic device of claim 16, wherein: the first electrode, the second electrode, and the third electrode are part of an electrocardiograph sensing system; and the second physiological parameter is an electrocardiogram.
18	The wearable electronic device of claim 16, further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input.
19	The wearable electronic device of claim 16, wherein the rear cover defines a convex exterior surface.
20	The wearable electronic device of claim 16, wherein the optical sensor comprises: an optical emitter configured to emit the optical signal through the optically transparent portion; and an optical receiver configured to receive a reflected portion of the optical signal through the rear cover.

Grounds Listing

GROUND 1	Claims 1–3, 5–6, 8, 10–14, and 16–20 are unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi and Coppola
GROUND 2	Claims 1–3, 5–6, and 10–14 are unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi and Schmid
GROUND 3	Claim 4 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola, and Tran
GROUND 4	Claim 15 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola, and Kateraas
GROUND 5	Claim 7 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Fraser
GROUND 6	Claim 9 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Honda
GROUND 7	Claim 8 is unpatentable as obvious under 35 U.S.C. § 103 in view of Kotanagi, Coppola or Schmid, and Miller

Pursuant to 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq.*, Masimo Corporation ("Petitioner" or "Masimo") requests *inter partes* review of Claims 1–20 of U.S. Patent No. 11,474,483 ("the '483 Patent").

I. MANDATORY NOTICES

1. Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

Masimo Corporation is the real party-in-interest.

2. Related Matters (37 C.F.R. § 42.8(b)(2))

Apple has asserted the '483 patent against Petitioner in *Apple Inc. v. Masimo Corporation and Sound United, LLC*, U.S. District Court for the District of Delaware, Case No. 1:22-cv-01378-MN ("the Delaware Litigation").

3. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner provides the following designation of counsel:

Lead Counsel	Back-up Counsel
Philip M. Nelson (Reg. No. 62,676) Knobbe, Martens, Olson, & Bear, LLP 2pmn@knobbe.com Postal and Hand-Delivery Address: Knobbe, Martens, Olson & Bear, LLP 2040 Main St., 14th Fl. Irvine, CA 92614 Telephone: (949) 760-0404 Facsimile: (949) 760-9502	Jarom D. Kesler (Reg. No. 57,046) Knobbe, Martens, Olson, & Bear, LLP 2jzk@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel Ted M. Cannon (Reg. No. 55,036) Knobbe, Martens, Olson, & Bear, LLP 2tmc@knobbe.com Postal and Hand-Delivery Address: Same as lead counsel

Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 64,735 listed in that Power of Attorney.

4. Service Information (37 C.F.R. § 42.8(b)(4))

Service information above. Petitioner consents to electronic service by email to MasimoIPR-483@knobbe.com.

A. Payment of Fees

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

B. Grounds for Standing (37 C.F.R. § 42.104(A))

Petitioner hereby certifies that the '483 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

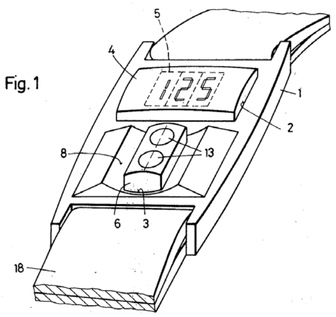
II. BACKGROUND

Wearable electronic devices have taken the form of smart watches for decades, and these have long included health monitoring features. When Apple released its first smart watches in 2015, the company joined a long tradition. The chart[1] below shows some biosensor smartwatch patent figures through the decades:

[1] These references are discussed further in EX1003 ¶¶56–101.

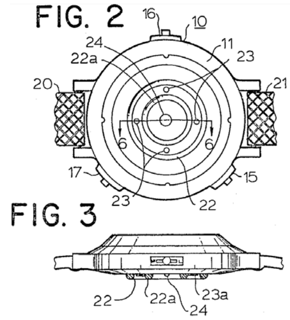
Masimo v. Apple
IPR Petition – U.S. Patent No. 11,474,483

1978



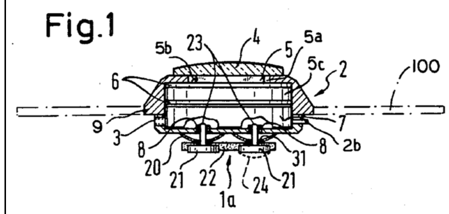
EX1022

1980



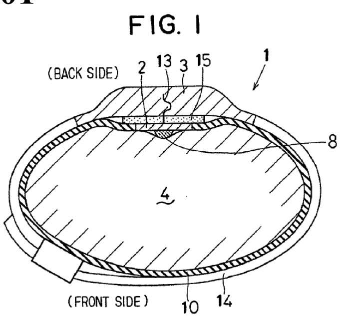
EX1026

1983



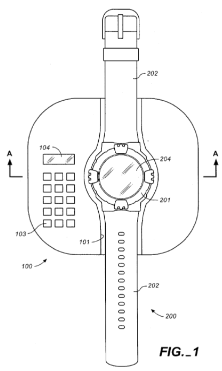
EX1029

2001



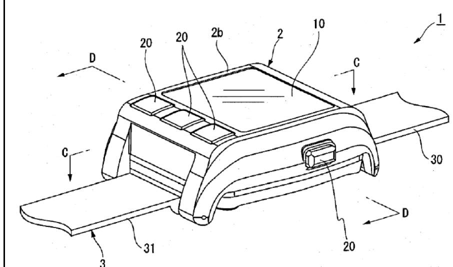
EX1007

2001



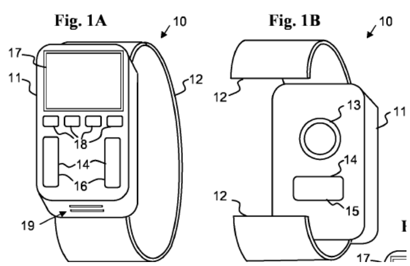
EX1006

2005



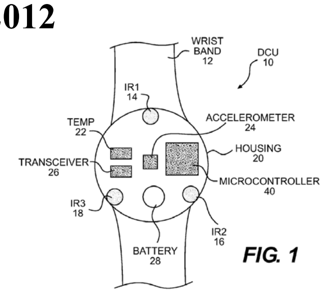
EX1005

2012



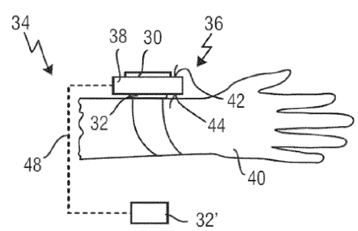
EX1008

2012



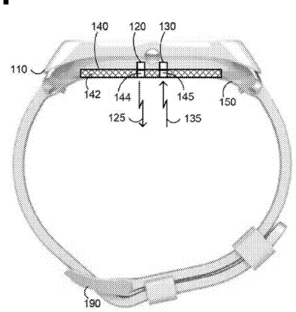
EX1014

2014



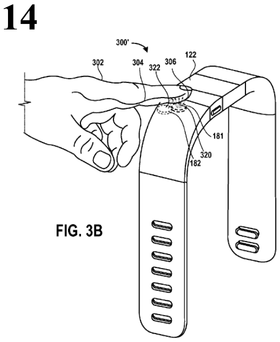
EX1020

2014



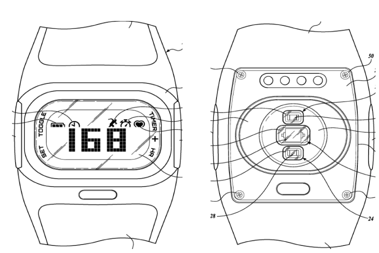
EX1041

2014



EX1016

2014



EX1010

Not all of these references are used as a substantive basis for this petition. However, the figures above (and the overview of developments in earlier decades, EX1003 ¶¶56–101, e.g., discussing EX1022–EX1031, and EX1033–EX1035) suggest the rich history of this crowded field.

A. Reliance on Expert Analysis and Testimony

As with most patentability challenges, technical issues are highly relevant to this petition, including to show what would have been known or understood by a person of ordinary skill in the art prior to the time the application was filed ("POSITA"). Accordingly, this Petition largely adopts the expert analysis and testimony of R. James Duckworth, Ph.D. EX1003 ¶¶ 1–286.[2]

B. Overview of the '483 Patent

Apple's '483 patent alleges improvements to health-monitoring smart watches, but the challenged claims (Claims 1–20 of the '483 Patent) merely recite features that were well known prior to that Patent, and their combinations in the claims provided no unexpected results or benefits. The following compares '483 patent figures to those from a 2005 patent publication by Kotanagi (EX1005):

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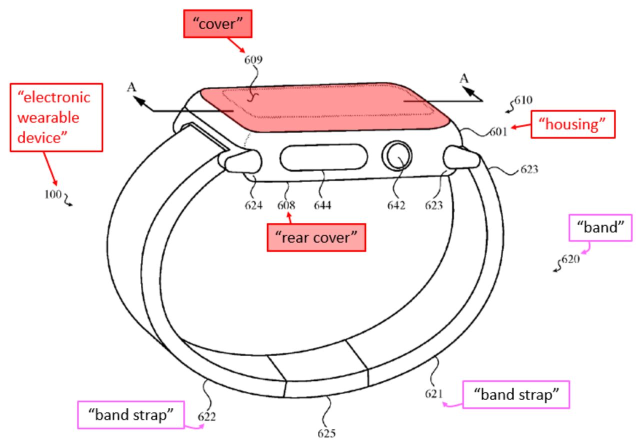
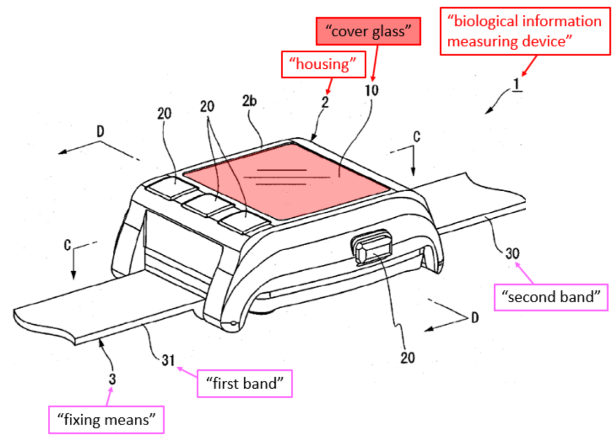
[2] In general, herein, a single citation to Dr. Duckworth's expert declaration is provided at the end of each paragraph or section that is supported by Dr. Duckworth's testimony.

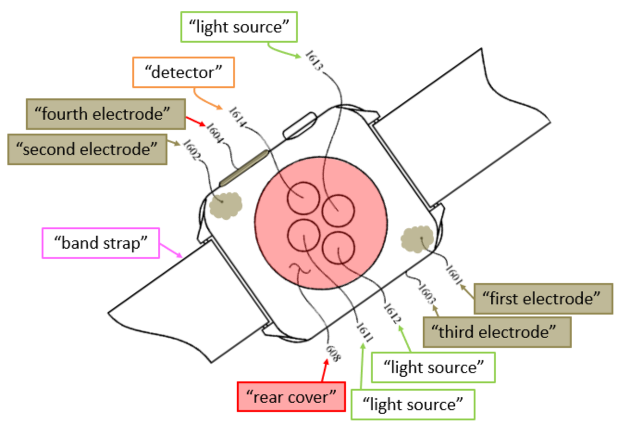
’483 Patent



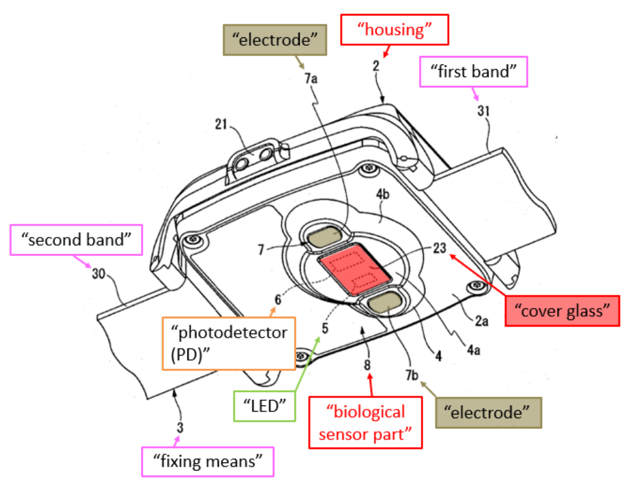
Prior Art – Kotanagi



’483 Patent



Prior Art - Kotanagi



See[3] EX1001 at 13, 23 (Figs. 6 and 16); *see* EX1005 at 25–26 (Figs. 4 and 5). EX1003 ¶45.

3 In this petition, color feature labels and color shadings are added for convenience and do not come from the cited patent drawings themselves.

Failing to cite Kotanagi was a material oversight in the examination of the ’483 patent. For example, for allowance Apple relied on claims reciting two electrodes on the watch’s rear exterior surface. EX1002 at 138–142. However Kotanagi teaches two such rear electrodes, 7a and 7b. These and other limitations were known in the prior art. EX1003 ¶¶46–48.

C. Prosecution History

The Examiner rejected all pending Claims 21–40 in a Non-Final Rejection. EX1002 at 700–702. The rejection gave little weight to locations of electrodes:

> Hong et al. teaches that skin conductance electrodes may be mounted on the strap. However, this difference merely pertains to the location of the electrode sensors, not to the function. The function of the sensors is independent or [sic] location, whether in the housing or on the band the sensors would function in the same manner and provide the same data. Thus, the location of the sensor, as long as it contacts the skin, does not affect or influence the operation of the sensor and presents little critical structure.

EX1002 at 704–705. EX1003 ¶51.

However, Apple responded by emphasizing electrode locations: “skin-contacting electrodes[] cannot simply be moved to another location without incurring significant engineering challenges.” EX1002 at 144. Consistent with this

emphasis, Apple amended the claims to recite the positions of the three electrodes. *Id*. at 138–142. The Examiner thereafter issued a Notice of Allowance, stating "the prior art fails to describe the configuration of the electrodes as presently recited *with respect to the locations on the housing*." EX1002 at 40 (emphasis added). EX1003 ¶¶52–54.

The '483 prosecution history shows that the Examiner did not consider, and Applicant did not cite, any of the references that Petitioner relies on in the grounds of this Petition. *See generally* EX1002. These references teach what the Applicant alleged was missing from the prior art: a biosensing watch with ECG electrodes on the back, front, and side of the watch housing. EX1009 16:21–23; EX1020 14:14–16. EX1003 ¶53.

D. Priority

The '483 patent was filed February 15, 2022. It is a continuation of U.S. Application No. 17/188,966, filed on March 1, 2021 and of U.S. Application No. 17/188,995, filed on March 1, 2021, both of which are continuations of U.S. Application No. 16,826,130, filed on March 20, 2020. The '130 application Claims priority to U.S. Application Nos. 15/261,912, 15/261,914, and 15/261,917, all filed on September 10, 2016. EX1002 at 900–903. These three applications are all continuations of U.S. Application No. 14/842,617, filed September 1, 2015, which Claims priority to provisional application 62/044,974, filed September 2,

2014. EX1002 at 900–903. Thus, the earliest alleged priority date of the '483 Patent is September 2, 2014. EX1001 at 2.

E. Level of Ordinary Skill in the Art

A POSITA of the '483 patent would have had at least a bachelor's degree in a discipline related to biomechanical devices, such as Mechanical Engineering, Biomedical Engineering, Electrical Engineering, Physics, Industrial Design, or an equivalent discipline, and at least three years of experience working with or developing electronic medical or consumer devices. EX1003 ¶¶33–36.

F. Claim Construction

Numerous claim terms are construed—based on their ordinary meanings or otherwise—in the context of the invalidity analysis in this petition, consistent with *Phillips v. AWH Corp*., 415 F.3d 1303 (Fed. Cir. 2005).[4] Construction of an example phrase is also discussed here for convenience. EX1003 ¶¶37–38.

---

[4] Petitioner's position regarding the scope of the claims should not be taken as an assertion regarding the appropriate claim scope in other adjudicative forums where a different standard of claim construction and/or claim interpretation may apply, or where the claim language and context differs.

1. "defining an optically transparent window"

Claims 1 and 10 recite that a cover "defines" an optically transparent window. The '483 patent does not provide a special definition for "window," although the '483 patent often recites "windows or apertures." EX1001 28:38–29.[5] The '483 patent refers to windows in the following context:

> The device 100 may also include a rear cover 608 located on the rear-facing surface of the housing 601 of the device body 610 . . . . [T]he biosensors are disposed relative to or attached to a rear cover 608 that is formed from an optically transparent material and is configured to be positioned with the opening of the housing 601 .
>
> * * *
>
> The convex curved area of the rear cover 608 may include one or more windows or apertures that provide operational access to one or more internal components located within the housing. For example, the rear cover 608 may include an array of windows, each window including an aperture or opening for a respective light source 1611–1613 and/or the detector 1614.

EX1001 27:46–48, 42:28–49. EX1003 ¶39.

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[5] Citations containing a colon (":") are to columns and lines, where available, or to bates-numered pages and lines, where lines are numbered. Citations to documents having square brackets "[]" for paragraph numbering use brackets instead of paragraph symbols "¶".

Accordingly, the '483 patent describes a single sheet of material (rear cover 608) positioned within a single opening in a housing (opening 601). In Figure 16, this sheet defines multiple windows or apertures, where the detector and light sources are positioned immediately behind that sheet.

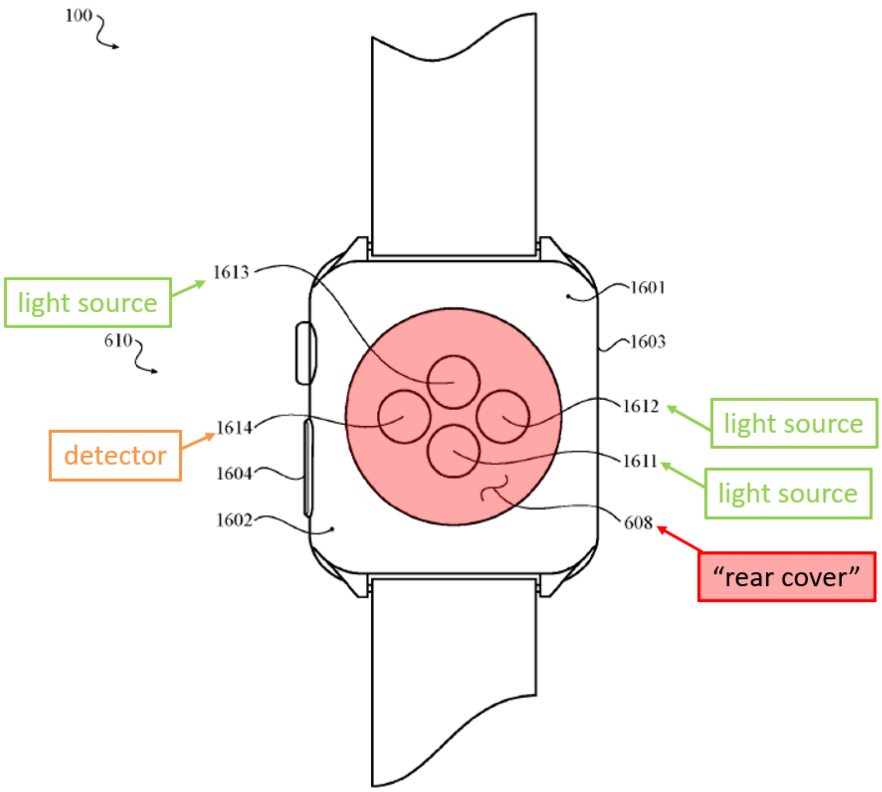

FIG. 16

See EX1001 at 23. Thus, for a cover to "define" an optically transparent window simply means to allow passage of light to a relevant component through the cover. In the '483 patent, the single rear cover 608 "defines" multiple optically transparent windows by allowing passage of light through the round portions labeled 1611–1614 in Fig. 16. EX1003 ¶¶40–41.

II. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Masimo Corporation hereby certifies that the ’483 Patent is available for *inter partes* review and that Masimo Corporation is not barred or estopped from requesting *inter partes* review challenging the patent Claims on the grounds identified herein.

G. Status of the References as Prior Art

The following references are prior art to the ’483 patent (earliest alleged priority of September 2, 2014) for the following reasons:

Exhibit No.	Description	Prior Art Basis
1001	’483 patent (background section)	Admitted Prior Art
1005	Kotanagi	Post-AIA 35 U.S.C. §102(a)(1) – published October 6, 2005
1006	Honda	Post-AIA 35 U.S.C. §102(a)(1) – issued July 24, 2001
1014	Kateraas	Post-AIA 35 U.S.C. §102(a)(1) – published August 30, 2012
1020	Coppola	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed April 2, 2014 (see EX1009)
1029	Schmid	Post-AIA 35 U.S.C. §102(a)(1) – published March 1, 1983

Exhibit No.	Description	Prior Art Basis
1034	Tran	Post-AIA 35 U.S.C. §102(a)(1) – published November 29, 2007
1041	Fraser	Post-AIA 35 U.S.C. §102(a)(2) – effectively filed June 5, 2014
1049	Miller	Post-AIA 35 U.S.C. §102(a)(1) – issued January 7, 2014

These references constitute analogous art because they are from the same field of endeavor as the ’483 patent, e.g., biosensing watches and personal electronic devices. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was involved, e.g., arrangement of optical and electrical biosensors on such devices. As these references are analogous art, a POSITA is presumed to have been aware of them. *In re Nilssen*, 851 F.2d 1401, 1403 (Fed. Cir. 1988). The volume and character of the overlapping features between the references listed above and the subject patent provides further evidence that these references are analogous art and highly relevant for a POSITA. For example, the side-by-side figures in § II(B) titled “Overview of the ’483 Patent” show many similarities between the patent and the Kotanagi reference. These figures and similar figures throughout this document support the 35 U.S.C. § 103 (or obviousness) combinations generally, and also support the conclusion that these references are

analogous art. Accordingly, a POSITA is presumed to have been aware of them. *Id*. As set forth in detail below in the context of the invalidity analysis, a POSITA would have been motivated to combine these references prior to the filing of the ’483 patent for many additional reasons. EX1003 ¶¶111–112.

a. Fraser 35 U.S.C. § 102(a)(2) Analysis

Fraser (EX1041) is a U.S. patent publication. Filed August 19, 2014, it predates the earliest priority of the ’483 patent and is therefore prior art. 35 U.S.C. § 102(d)(1). EX1003 ¶113.

b. Coppola 35 U.S.C. § 102(a)(2) analysis

PCT Pub. No. WO 2015150199 (“Coppola” EX1020) was published on October 8, 2015 and is prior art under post-AIA 35 U.S.C. § 102(a)(2) because it designates[6] the United States and Claims an effective filing date that predates the earliest effective filing date of the ’483 patent. Specifically, WO 2015150199 Claims priority to EP14163114.3, filed April 2, 2014 (“Coppola EP,” EX1009).

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[6] *See* 35 U.S.C. § 374 stating “The publication under the treaty defined in section 351(a), of an international application designating the United States shall be deemed a publication under section 122(b), except as provided in section 154(d)”

Coppola is literally supported by the filing in Europe of Coppola EP. Coppola EP's Figures 1–8 are identical to the published figures in Coppola. EX1020 at 24–28; EX1009 at 27–30. Coppola EP provides support[7] for every limitation relied upon in this petition, as shown by parallel pinpoint citations in this

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[7] *Dynamic Drinkware, LLC, v. National Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015) held that held that a reference patent alleged to be prior art under pre-AIA 35 U.S.C. § 102(e) "is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1." To the extent *Amgen v. Sanofi*, 872 F.3d 1367, 1380 (Fed. Cir. 2017) or other cases may extend this requirement to Masimo's use of *Coppola* (a PCT publication claiming priority to an earlier European patent application, in a post-AIA context), Masimo makes such a showing, e.g., in EX1003 ¶¶116–120. *See Mueller Sys., LLC v. Rein Tech, Inc.*, Case No. IPR2020-00100, 2020 WL 2478524, at *10 (PTAB May 12, 2020); *Epizyme, Inc. v. GlaxoSmithKline LLC*, Case No. IPR2020-01577, 2021 WL 841118, at *10–11 (PTAB Mar. 5, 2021). USPTO guidance calls into question whether *Dynamic Drinkware* and *Amgen* apply to post-AIA patents. EX1047 at 3.

petition to both Coppola and the earliest effective filing disclosure, Coppola EP. EX1003 ¶¶114–120.

III. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

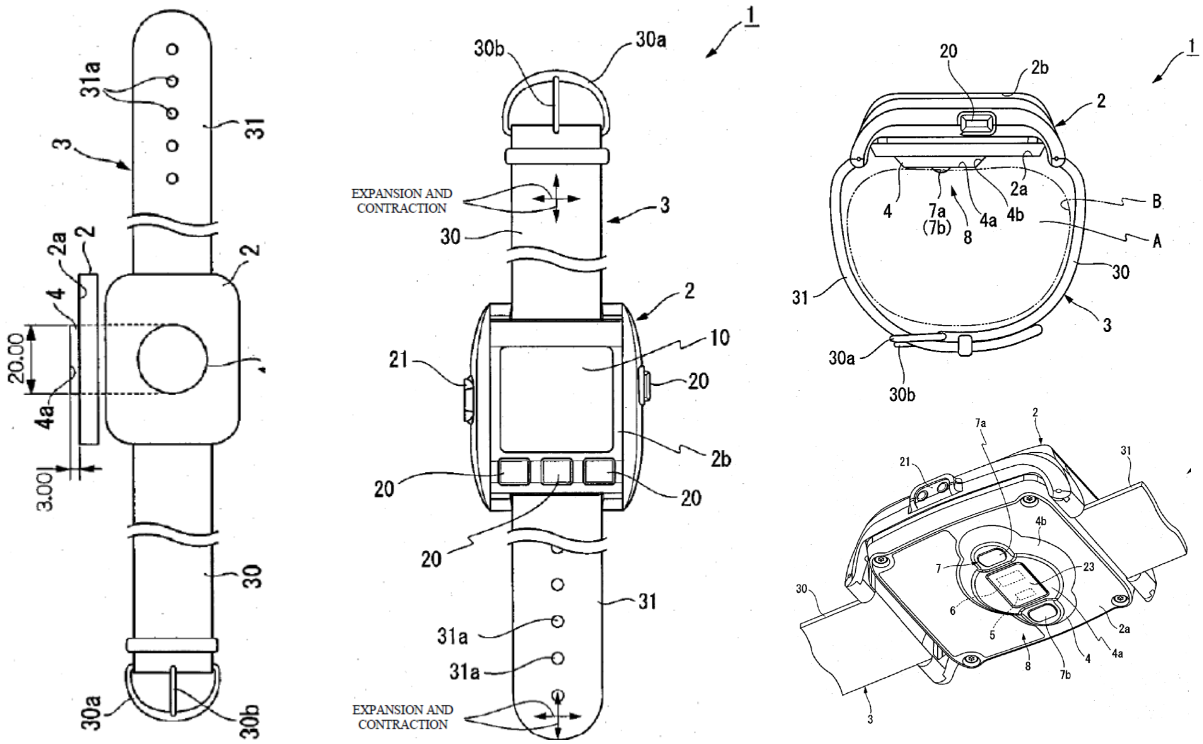
As explained below, Claims 1–20 of the '483 patent would have been obvious under 35 U.S.C. § 103 in view of the prior art identified below. The cited references teach every claim limitation, though not always using identical terminology. *See In re Bond,* 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*). EX1003 ¶121.

H. Ground 1: Claims 1–3, 5–6, 10–14, and 16–20 are unpatentable because they would have been obvious over Kotanagi in view of Coppola.

1. Independent Claim 1

a. [1a] "A wearable electronic device comprising:"

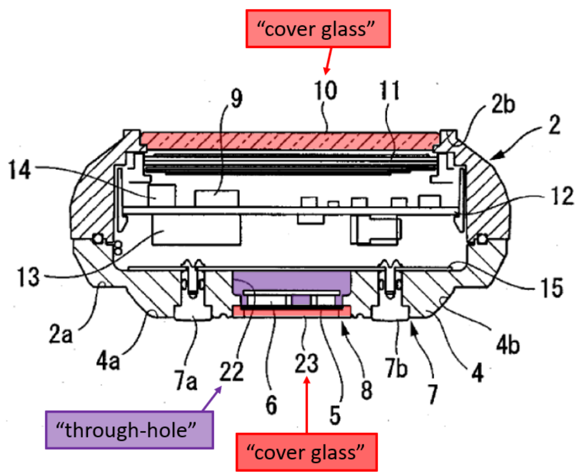
Kotanagi describes a "wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist." EX1005 ¶44. EX1003 ¶122.

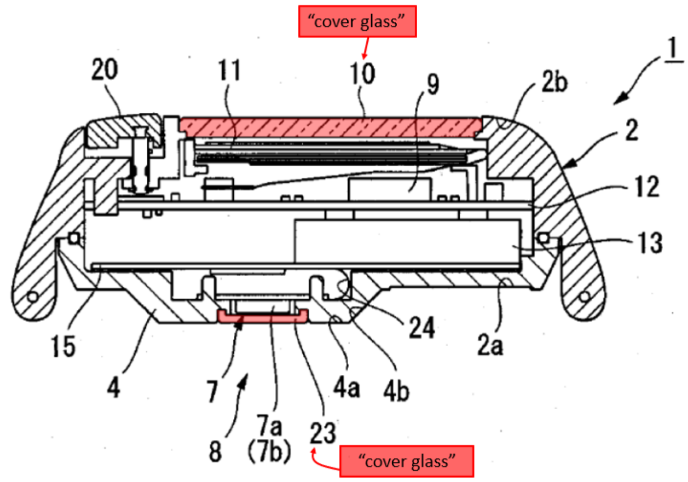


EX1005 at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. [1b] "a housing defining a first opening and a second opening;"

Kotanagi teaches a "housing 2 . . . made of plastic or a metal material such as aluminum." EX1005 ¶48. Kotanagi's housing has a "first opening" at the top and a "second opening" ("through-hole 22") at the bottom, both shown in the cross-sections below. The cover glass 10 and the cover glass 23 span these openings:

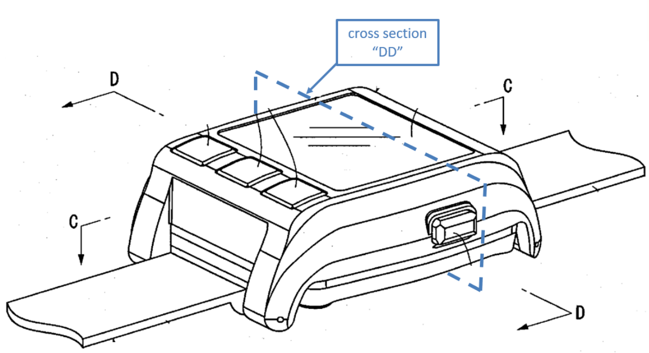


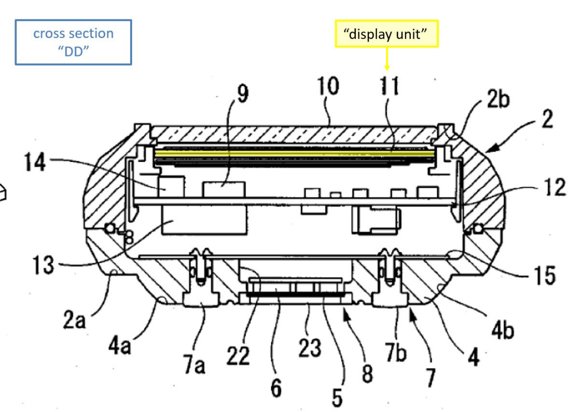


EX1005 at 27 (Figs. 7, 6). EX1003 ¶123.

c. [1c] "a display positioned at least partially within the first opening;"

In Kotanagi, a "cover glass 10 with a substantially square shape is fitted into the central portion of the upper surface 2b of the housing 2, and a display part 11 for displaying the aforementioned pulse rate that is detected and various other information is disposed inside the cover glass 10." EX1005 ¶48.

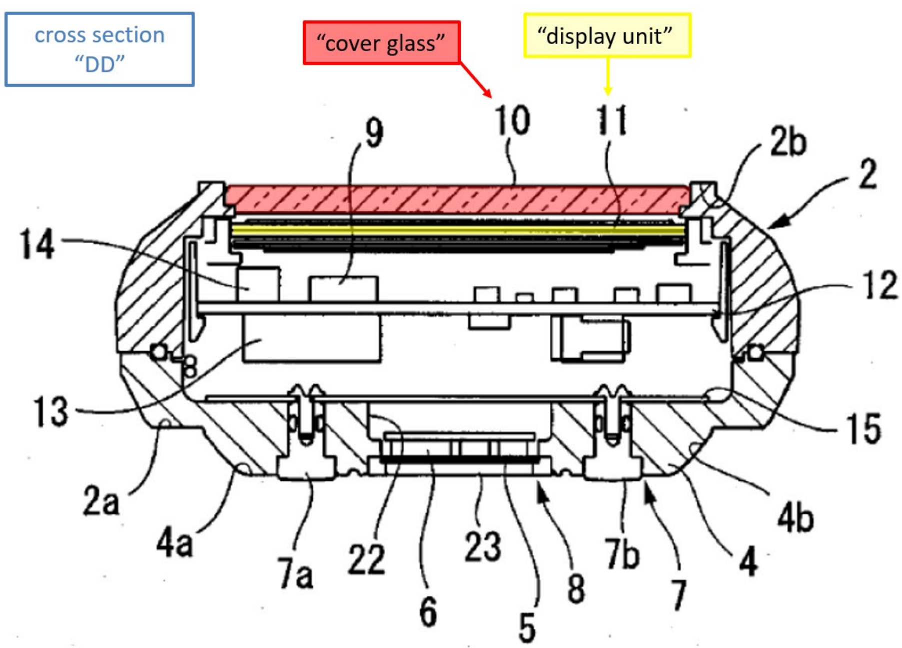




See id at 25, 27 (Figs. 4, 7). EX1003 ¶124.

d. [1d] "a front cover positioned over the display and defining at least a portion of a front exterior surface of the wearable electronic device;"

In Kotanagi, "a display part 11 for displaying the aforementioned pulse rate that is detected and various other information is disposed inside the cover glass 10." EX1005 ¶48. This cover glass 10 defines at least a portion of the front exterior surface of the device:



See id at 27 (Fig. 7). EX1003 ¶125.

e. [1e] "a biosensor module comprising:"

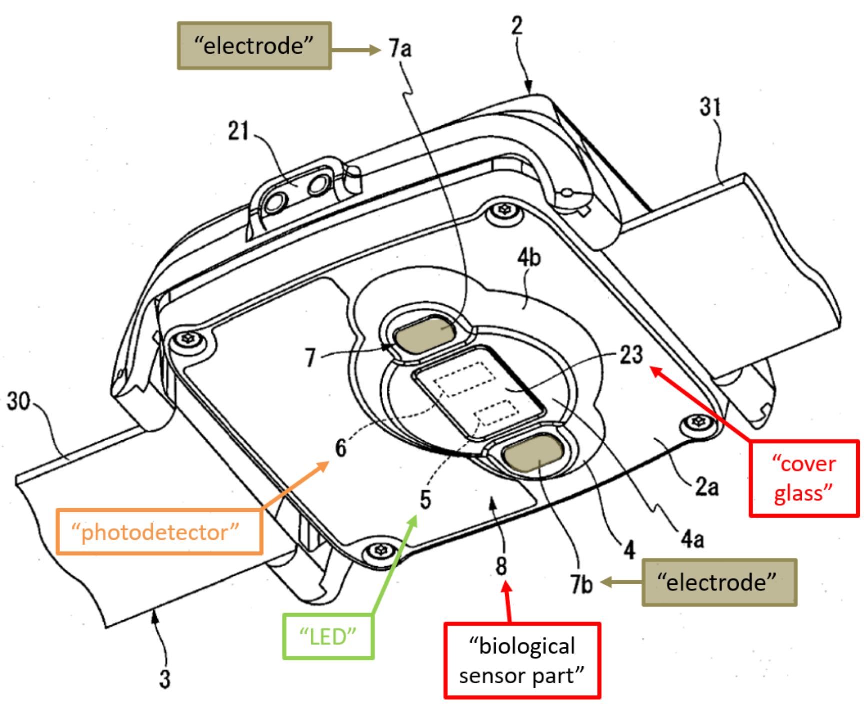
Kotanagi teaches

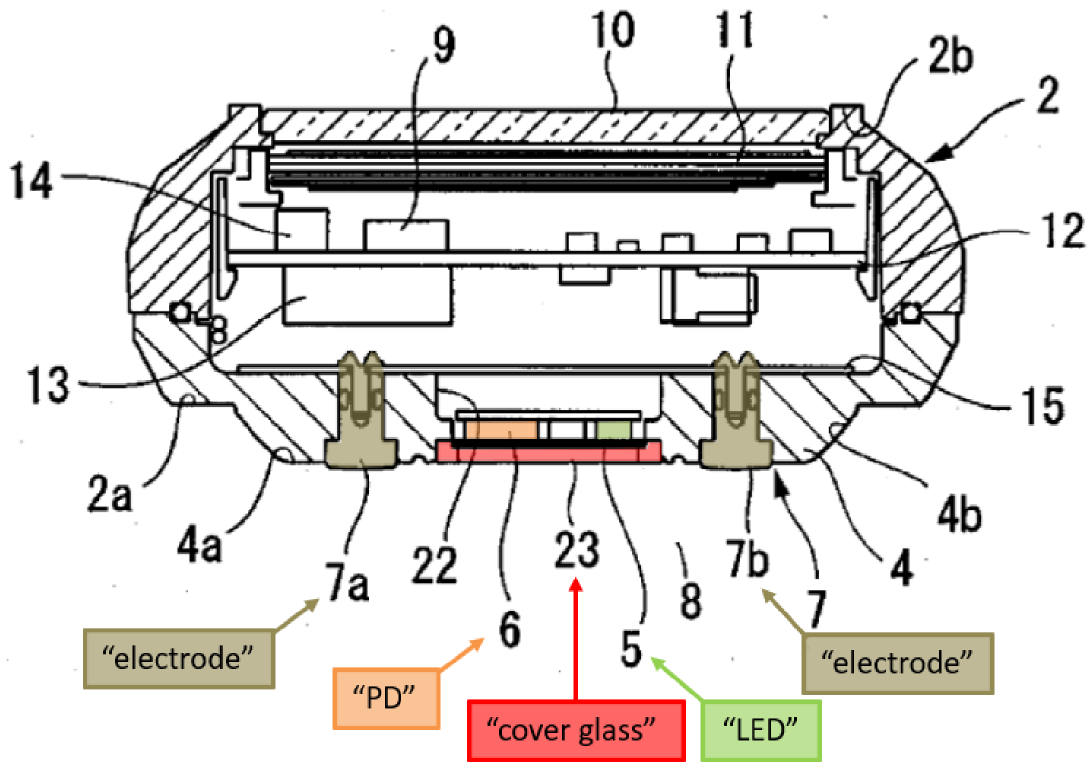
A biological sensor part 8, which includes an LED (Light

> Emitting Diode) (light-emitting part) 5 for emitting light toward the living body while in contact with the living body surface B side, a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body... and a contact detection means 7 for detecting whether the LED 5 and the PD 6 are in contact with the living body surface B, is disposed on the lower surface 4a of the protruding part 4.

EX1005 ¶46.

Kotanagi teaches such a module, which also satisfies subsequent limitations stating that it comprises: [1f] a rear cover (cover glass 23); [1g] an optical sensor (photodetector 6 and LED 5); and [1h] electrodes (electrodes 7a/7b). This biosensor module is located at the rear of Kotanagi's device, as illustrated below:

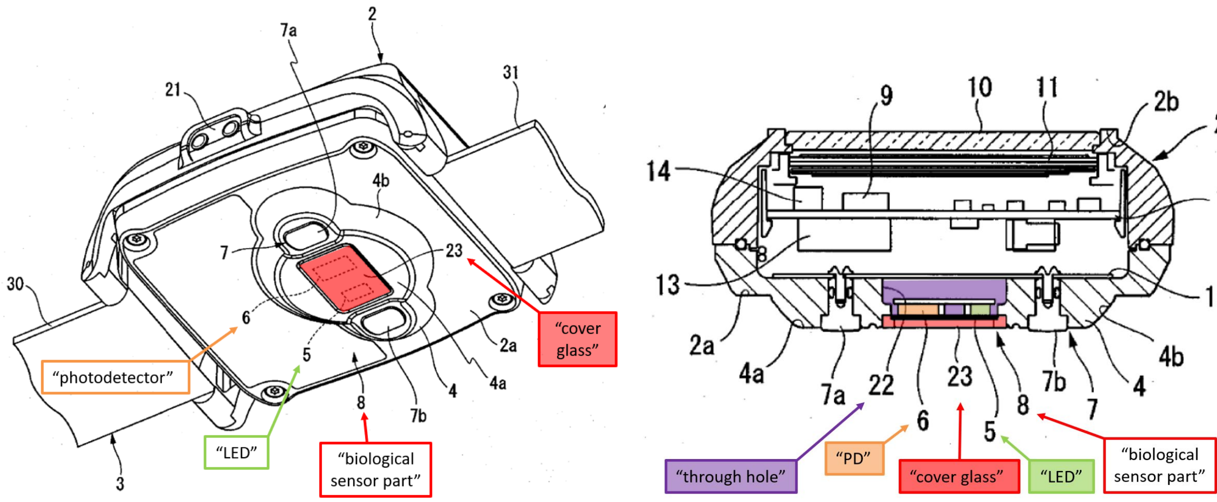




See id. at 26, 27 (Figs. 5, 7). EX1003 ¶¶126–127.

f. [1f] "a rear cover positioned at least partially within the second opening and defining an optically transparent window"

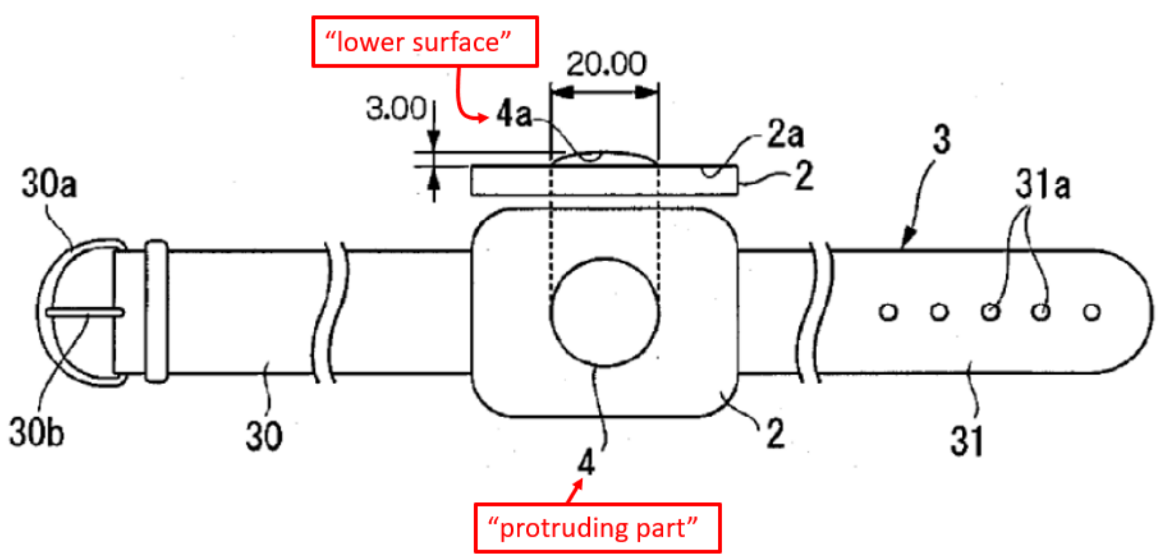
Kotanagi has a cover glass 23 "fixed to the housing 2 so as to block the through-hole 22." EX1005 ¶55. It is thus positioned within the second opening. It is also optically transparent because it allows the LED 5 to emit light toward the living body, and through it, the photodetector 6 receives "reflected light corresponding to the pulsation of arteries." *Id.* ¶65.



See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶128.

g. [1g] "and a protruding convex surface;"

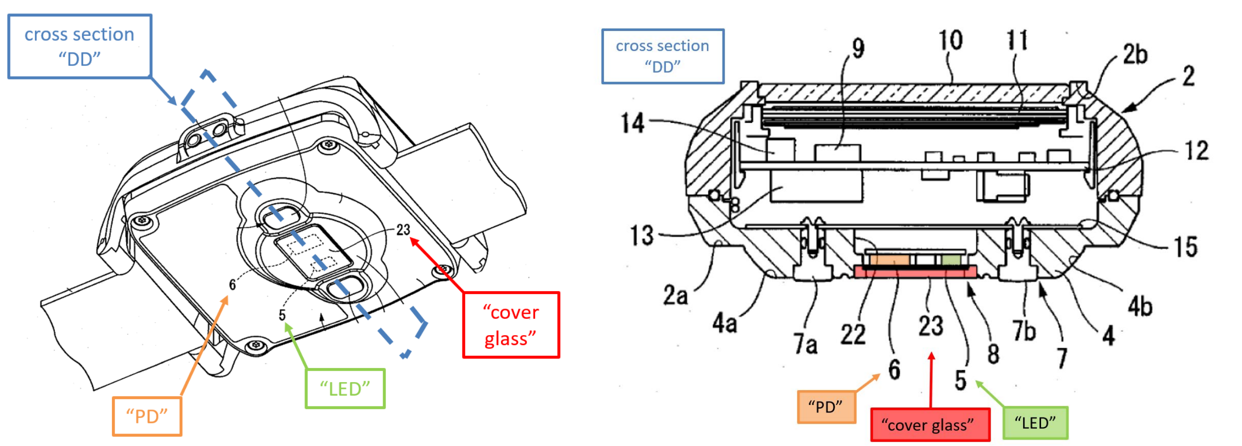
Kotanagi teaches the cover can form, or comprise part of, a convex protrusion: "Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10." EX1005 ¶(0080).



See EX1005 at 28 (Fig. 10). A POSITA would have understood from Kotanagi's Figure 10 that the protruding part can form a convex "cover glass" that spans the through-hole 22. *Id.* at 28. Kotanagi states that its protruding part causes the body to "deform[] smoothly," which "enhances the adherence." EX1005 ¶¶35, 80. EX1003 ¶¶129–130.

h. [1h] "an optical sensor aligned with the optically transparent window;"

Kotanagi's "LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." EX1005 ¶55. Thus, Kotanagi has an optical sensor aligned with the optically transparent window.

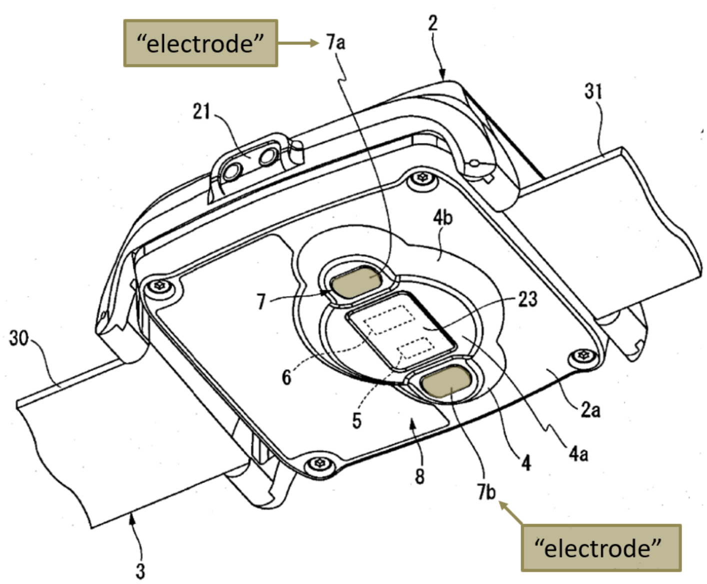


See EX1005 at 26, 27 (Figs. 5, 7). EX1003 ¶131.

i. [1i] "a first electrode positioned along a rear surface of the wearable electronic device; and a second electrode

positioned along the rear surface of the wearable electronic device; and"

Kotanagi's rear electrodes 7a and 7b are intended for detecting whether there is contact with a living body surface. EX1005 ¶59:



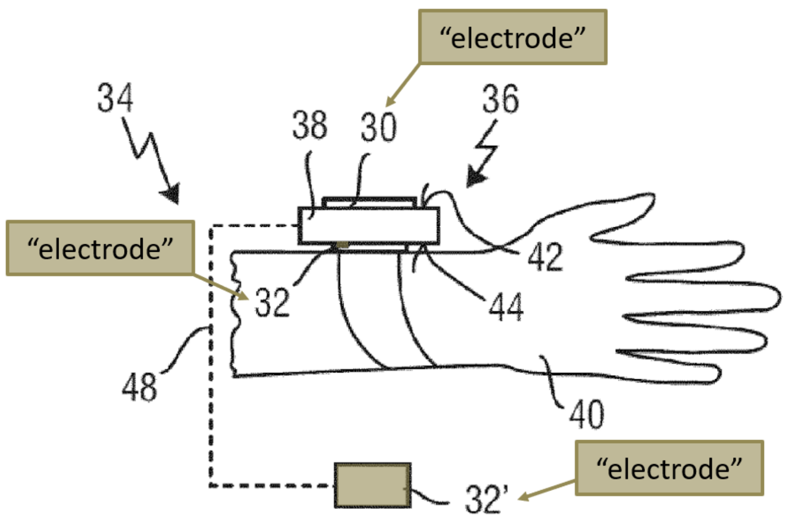
See id. at 26 (Fig. 5). As shown, they are positioned as claimed. EX1003 ¶132.

j. [1j] "a third electrode positioned along a side of the wearable electronic device, wherein:"

Kotanagi teaches that "the electrodes need not be a pair, and a plurality of electrodes, for example, may be provided" for detecting a potential difference. EX1005 ¶14; s*ee Id.* ¶86 (plurality of electrodes). Thus Kotanagi itself teaches or suggests a third electrode, which can also be used to measure skin contact. Alternatively, the third electrode could be added (e.g., to a different area of

Kotanagi's watch) to provide an ECG measurement as is well known in the art. A POSITA would have considered this option based on Kotanagi's teaching of additional electrodes and the known benefits of electrocardiography. EX1003 ¶133.

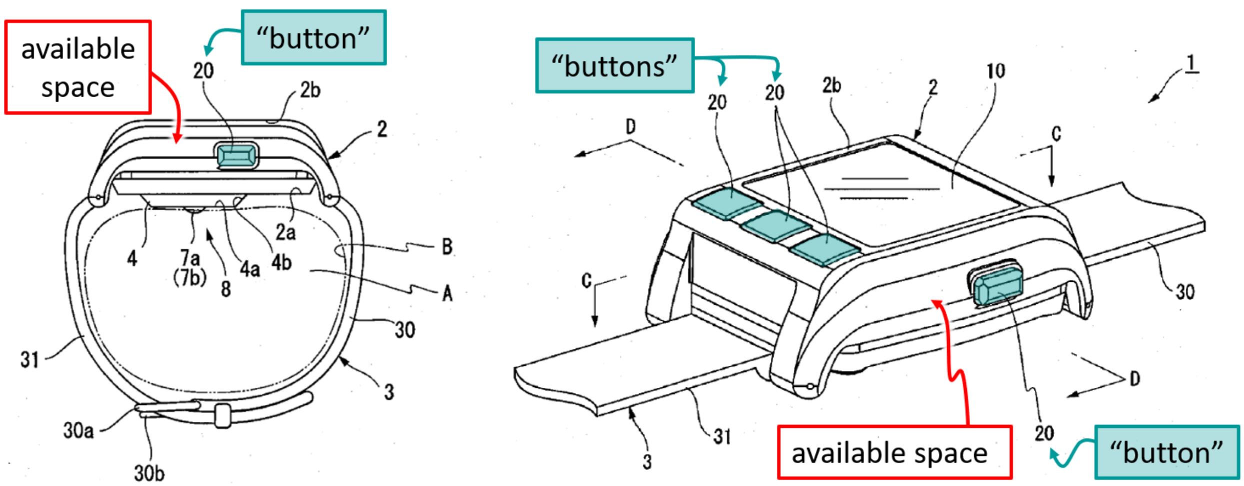
A POSITA would have looked to other similar devices with multiple electrodes in the same field of endeavor, such as Coppola. This reference also teaches a biosensing watch with multiple electrodes:



See EX1009 at 28; EX1020 at 25 (Fig. 3). Coppola explains how dangerous conditions such as atrial fibrillation (AF) and their causes are detected by electrocardiography (ECG)—especially when combined with optical sensors, e.g., photoplethysmograph (PPG) sensors. EX1020 2:22–31, 3:10–21; EX1009 4:22–32, 5:10–21. Given these life-saving benefits, a POSITA would have configured Kotanagi's multiple electrodes for ECG measurements to enhance its optical

measurements. EX1003 ¶¶134–135.

To accomplish this, Coppola teaches placing an electrode on the side or strap of a biosensing watch. EX1009 16:21–23; EX1020 14:14–16. Placing it on the side instead of the top also allows a GUI element to "cover the whole front side 42 of the watch." *Id.* This is consistent with, in Kotanagi's case, minimizing disruption of Kotanagi's display and front buttons. Kotanagi has available space for a side electrode, so adding Coppola's side electrode would have been feasible:



See EX1005 at 24, 25 (Figs. 2 and 4).

Coppola teaches exact electrode location is not critical, but "more than two electrodes" and placing electrodes on "different surfaces" is valuable: "at least one electrode 30, 32 may be arranged on a back surface 54 or a side surface." EX1009 18:5–7 ; EX1020 15:32–16:1. EX1003 ¶¶136–137.

Coppola illustrates top and side electrodes in Figures 5A and 5B:

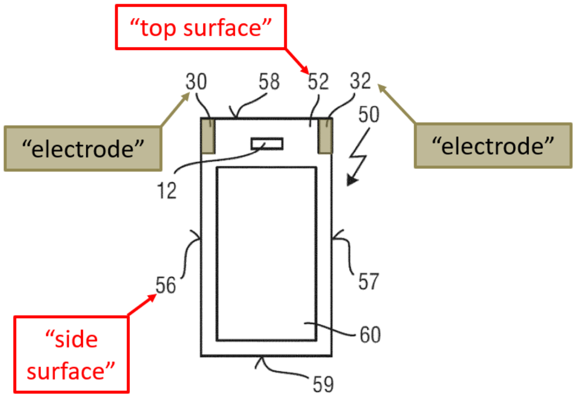


FIG. 5A

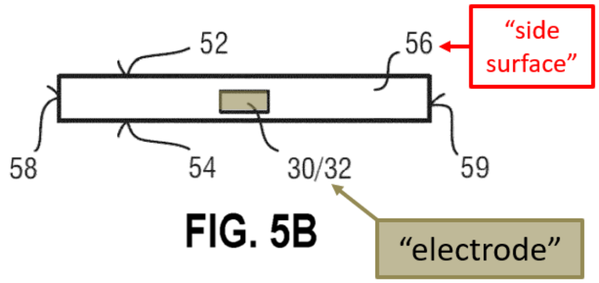


FIG. 5B

See EX1009 at 28; EX1020 at 26. Based on both Kotanagi's and Coppola's teachings of multiple electrodes, a POSITA would have known to add a third electrode[8] and, by positioning it on the side (Kotanagi already has two in the rear), enabling ECG measurement while leaving room for a larger screen (and any existing buttons) on the front. EX1003 ¶138.

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[8] Many prior art watches have used three or more electrodes for ECG measurement. EX1008 Figs. 1A–2B, Claim 15 (electrodes 14, 15, 16, three configurations); EX1011 Fig. 1 and EX1023 Fig. 1 (contacts 131 and 151); EX1027 Fig. 2 (electrodes on top, bottom, and band); EX1029 at 5–13, Fig. 1 (electrodes N, A, A1 A2, 13, 32–34); EX1031 Fig. 1 (electrodes 14, 16, and 18); EX1033 Fig. 5 (conductive areas 560, 561, 515); EX1035 Figs. 2a, 2b and [0028] (electrodes 122, 124, 126).

k. [1k] "the wearable electronic device is configured to measure a first physiological parameter of a wearer using the optical sensor; and"

Kotanagi teaches that light reflected back to the PD 6 "varies depending on fluctuations in blood flow within arteries and arterioles in the wrist," so the PD generates "a pulse signal." EX1005 ¶65. This signal is measured by Kotanagi's optical sensor and is a physiological parameter. EX1003 ¶139.

l. [1l] "the wearable electronic device is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode."

Kotanagi's electrodes 7a and 7b contact skin to detect a "potential difference." EX1005 ¶59. A POSITA would have considered this potential difference a separate physiological parameter from the pulse signal because it involves a "discharge" through the skin. *Id.* ¶14 ("the pair of electrodes come into contact with the living body surface so that a discharge occurs through the living body surface").

As discussed above, Kotanagi also teaches that the "electrodes need not be a pair" and a "plurality of electrodes" may be provided. *Id.* ¶¶14, 86. EX1003 ¶133. Coppola teaches a biosensing watch with "electrical sensing unit [that] comprises an electrocardiography ECG unit comprising at least a first and a second electrode,

the heartbeat-related electrical signal comprising an ECG signal. Advantageously, this embodiment exploits the well-established ECG technique which is able to provide deep insights into the cardiac cycle." EX1009 8:23–27; EX1020 6:13–17. For such deep insights, a POSITA would have added Coppola's ECG capability to Kotanagi—for example, by adding "even more than two electrodes." EX1009 17:20–23; EX1020 15:12–16. EX1003 ¶¶140–141.

Adding ECG capability to Kotanagi would have been highly desirable—e.g., to help address atrial fibrillation problems, etc. as explained by Coppola (EX1020 2:22–31, 3:10–21; EX1009 4:22–32, 5:10–21)—and could be accomplished with relatively minor changes. Since Kotanagi teaches two electrodes on the bottom surface of the watch, a POSITA would have known from Coppola's teaching that "at least two of all [the] electrodes" should be "arranged on two different surfaces" (EX1009 18:5–6; EX1020 15:32–33) and would have added a third electrode "on the side" of Kotanagi's watch so that Kotanagi's screen "can cover the whole front side 42 of the watch" (EX1009 16:21–23; EX1020 14:14–16). This allows the side electrode to be "touched by a finger of the other hand" for ECG measurement (EX1020 7:8; EX1009 9:18–19) so that the "electrodes are separately contacted or contactable to two body parts on sides lying opposite one another with respect to the heart of the user" (EX1020 6:22–23; EX1009 8:32–33). EX1003 ¶143.

Thus, in view of the teachings of Kotanagi and Coppola, a POSITA would

have configured Kotanagi's device with a third, side electrode to measure ECG as a second physiological parameter. EX1003 ¶144.

m. Motivation to Combine Kotanagi and Coppola

Based on the teachings above, A POSITA would have been motivated prior to September 2014 to combine Kotanagi and Coppola. They are analogous art in the same field, both teaching a watch with optical and electrical biosensors. Kotanagi teaches an LED and PD to detect pulse rate and "a plurality of electrodes" to detect electrical potential. EX1005 ¶¶14, 46, 86. Coppola teaches a device that "advantageously combines an optical sensing unit such as a PPG unit and an electrical sensing unit such as an ECG unit within one system that can be particularly easily worn." EX1020 7:8–10; EX1009 9:19–21. A POSITA would have wanted to include ECG functions in Kotanagi's watch to better monitor heart health. EX1003 ¶145.

Kotanagi uses its rear electrodes to measure skin contact and electrical potential, teaching they "need not be a pair," but rather a "plurality." EX1005 ¶14; *see Id.* ¶86. Thus, a POSITA would have expected success in using Coppola to simply add a third electrode (e.g., to the side) and configure the electrodes for ECG measurement. Coppola uses electrodes according to "well-established ECG technique," teaching the value of "even more than two electrodes." EX1009 8:26, 17:22–23; EX1020 6:16, 15:15–16. EX1003 ¶146.

Coppola does not limit its electrodes to a specific location; they should be "arranged on two different surfaces" of the device. EX1009 18:5–7; EX1020 15:32–16:1. Coppola explains benefits for side positioning. EX1009 16:21–23; EX1020 14:14–16 ("the GUI element 46 can cover the whole front side 42 of the watch."). Thus, a POSITA would have expected success in using Coppola to add a third, side electrode to Kotanagi, would have configured the electrodes for ECG measurement, and would have made the other modifications shown above to be obvious. EX1003 ¶147.

In view of Coppola and the many three-electrode biosensor watches (e.g., *supra* note 8), a POSITA would have also found it obvious to provide three electrodes in Kotanagi's watch at least to: 1) gain insight into the cardiac cycle and address atrial fibrillation (*see* EX1020 2:22–31, 3:10–21, 6:13–17; EX1009 4:22–32, 5:10–21, 8:23–27); 2) improve signal to noise[9] ratio with backup or duplicate measurements; 3) provide additional sensors as a failsafe if one stops working; 4) provide multiple contact points that are easier to access; 5) allow for different measurements (ECG and skin conductance) to enhance the features and information available to the user; 6) provide additional contact points for

[9] EX1031 7:33–34 ("[t]he digital watch embodiment uses a three contact approach to help eliminate noise.")

continuous[10] skin contact during ECG measurements as the watch is bumped, shifted, or jostled (such as during exercise); 7) allow a user to take an ECG measurement from multiple areas "lying opposite one another with respect to the heart" (EX1009 17:21–22; EX1020 15:14–15); and/or 8) provide a reference electrode to measure the voltage between the two other conductive areas.[11] EX1003 ¶148.

Further, various permutations of biosensing watch electrodes were known[12] prior to the filing of the '483 patent. When the Examiner initially minimized the

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10 EX1031 3:25–26 ("loose contact between the electrodes and the skin . . . changes the impedance of this contact erratically").

11 EX1008 at 6 ("ECG signal" may be "extracted from the three conductive areas by using the signal of one conductive area as a reference and amplifying the differential voltage between the other two conductive areas").

12 *See* EX1008 at 19 (Claim 15, three configurations); EX1027 Fig. 2 (electrodes in top, bottom, band); EX1029 at Figs. 1, 5–13 (active ("A," 21, 33) and neutral ("N," 22, 32) electrodes); EX1030 Figs. 1, 2 (electrodes 4a and 4b); EX1031 Fig. 1 (electrodes 14, 16, and 18); EX1033 Fig. 5 (conductive areas 515, 560 and 561); EX1034 [0237] (electrode on band, back); EX1035 Figs. 2a, 2b

"location of the sensor" as not "critical" for a watch ECG (EX1002 at 705), the Applicant's response did not provide contrary evidence. EX1002 at 144–145. The evidence from Coppola teaches benefits of ECG placement in various locations, including "the side of the watch or on the strap." EX1020 14:14–16; EX1009 16:21–23. Thus, the claimed electrode arrangement is obvious. Coppola confirms that the placement of electrodes on various surfaces of a biosensing watch would have involved mere combinations of familiar elements according to known methods to yield predictable results. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. at 416 (2007). EX1003 ¶149.

This motivation applies equally to the other claims rejected under Ground 1. Further motivations are provided throughout this petition.

2. Dependent Claim 2

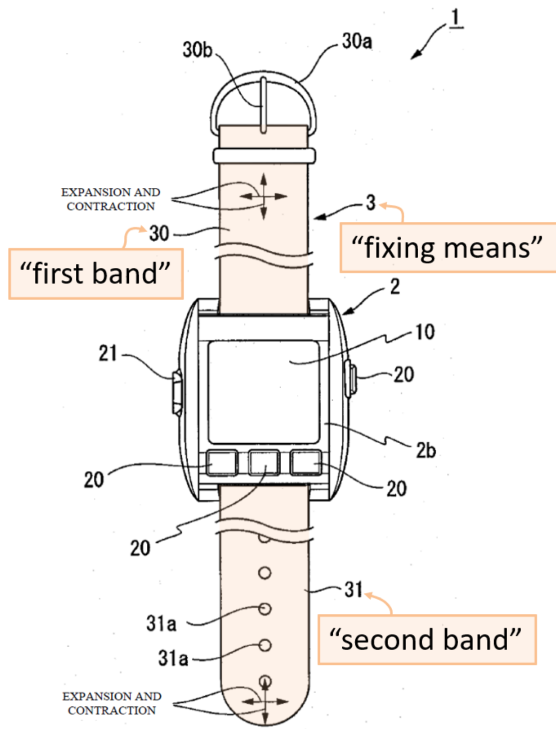
Claim 2 depends from Claim 1 and adds:

a. [2a] "the wearable electronic device further includes a watch band coupled to the housing and configured to couple the wearable electronic device to a wearer"

Kotanagi has a "means for fixing" the watch to an arm (EX1005 Abstract):

(electrodes 122 (front), 124 (back), and 126); EX1008 Figs. 1a, 1b (electrodes 16, 15).

"The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist." (*See id.* ¶60).



See EX1005 at 23 (Fig. 1). EX1003 ¶152.

b. [2b] "the optical sensor is a heart-rate sensor;"

Kotanagi teaches that reflected light from the LED 5 "varies depending on fluctuations in blood flow within arteries and arterioles in the wrist" and because it "can receive reflected light … the PD 6 can generate a pulse signal." EX1005 ¶65. EX1003 ¶153.

Kotanagi's watch measures heart rate in the same location as the '483 patent, in the wrist. A POSITA would have considered a "pulse signal" to teach a "hear-

rate" at least because they are directly correlated, the pulse manifests the rate, and pulse has the same cadence as heart contractions. EX1003 ¶154.

c. **[2c] "the first electrode is an electrode of an electrocardiograph sensing system; and"**

As discussed for limitation **[1l]**, Kotanagi in view of Coppola teaches an ECG measurement with a first, second, and third electrode. Using Kotanagi's existing electrodes to allow for different measurements (both ECG and skin conductance) would have enhanced the features and information available to the user, without removing their existing function taught by Kotanagi. Thus, the first electrode would be an electrode of an electrocardiograph sensing system, as it participates in the measurement of an ECG. EX1003 ¶155.

d. **[2d] "the second physiological parameter is an electrocardiogram."**

As discussed for limitation **[1l]**, Kotanagi in view of Coppola teaches an ECG measurement, consistent with this claim limitation. EX1003 ¶156.

3. Dependent Claims 3 and 5

Claims 3 and 5 have identical scope.[13] Both depend from Claim 1 and add

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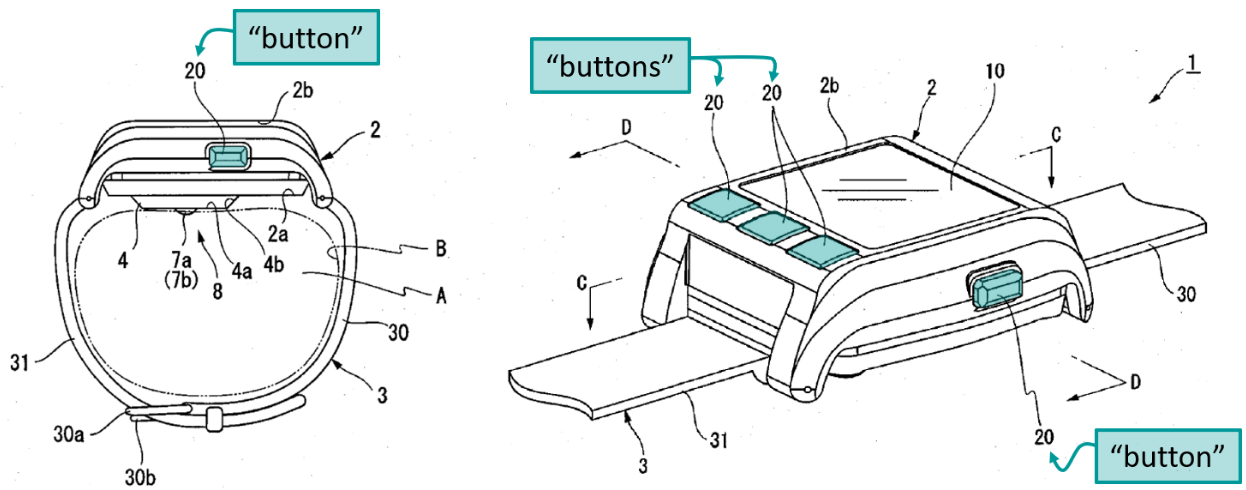
[13] Dependent Claims 3 and 5 are verbatim copies of each other and depend from the same independent claim.

"further comprising an input device positioned along a side of the housing and configured to receive at least one of a rotational input or a translational input."

Kotanagi teaches: buttons on the top of the housing; "one button 2[0] disposed on the side surface of the housing 2"; and that "[v]arious operations can be performed by pressing each of these buttons 20." EX1005 ¶52.



See EX1005 at 24, 25 (Figs. 2 and 4). EX1003 ¶158.

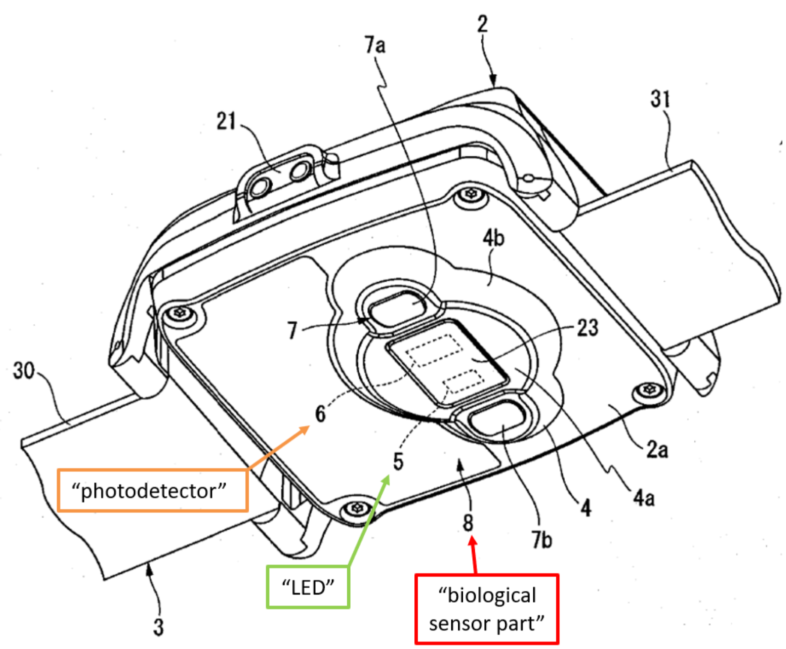
Pressing a button "translates" it inward, so Kotanagi teaches the claimed input device. This is consistent with how the '483 patent describes button movement: it "may be configured to translate along an axis when pressed or pulled by the user." EX1001 53:1–2. EX1003 ¶158.

4. Dependent Claim 6

Claim 6 depends from Claim 1 and further adds **"wherein the optical**

sensor comprises: an optical emitter configured to emit an optical signal; and an optical receiver configured to receive a reflected portion of the optical signal."

Kotanagi's optical sensor described with respect to limitation **[1h]** includes both the claimed emitter ("LED 5") and receiver ("a PD (Photodetector) (light-receiving part) 6 for receiving reflected light from the living body out of the light emitted by the LED 5."). EX1005 ¶46.

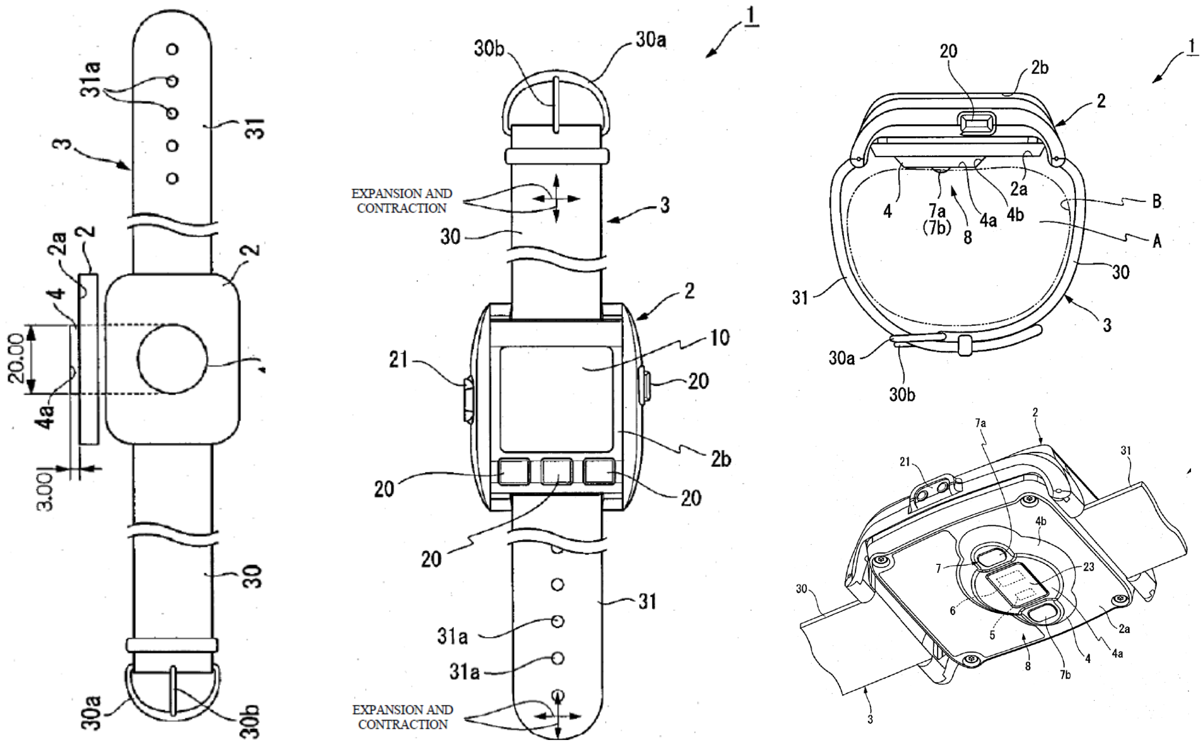


See EX1005 at 26 (Fig. 5). EX1003 ¶160.

5. Independent Claim 10

a. [10a] "An electronic watch comprising:"

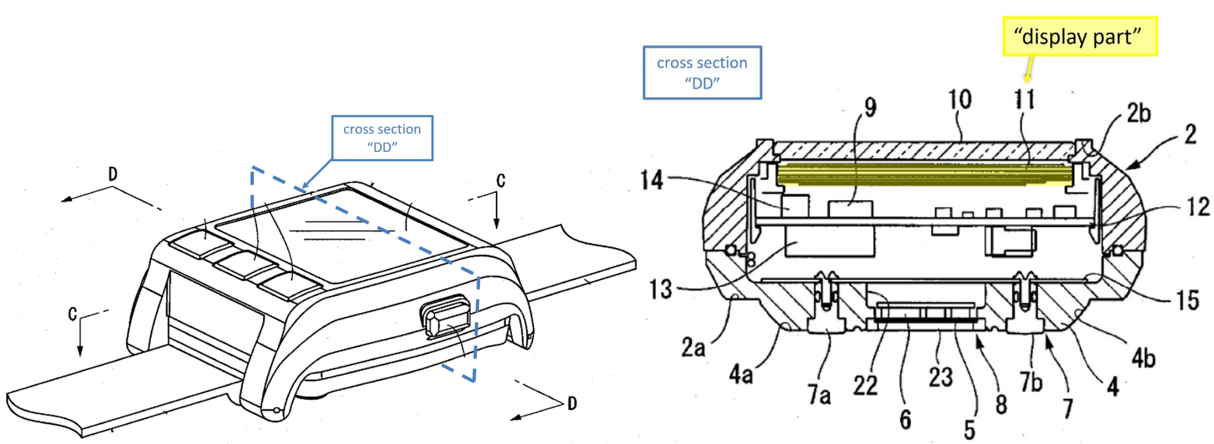
Kotanagi describes a "wristwatch-type device which detects pulse rate as a type of biological information while mounted to the wrist." EX1005 ¶44.



Id. at 23, 24, 26, 28 (Figs. 1, 2, 5, 8).

b. [10b] "a display;"

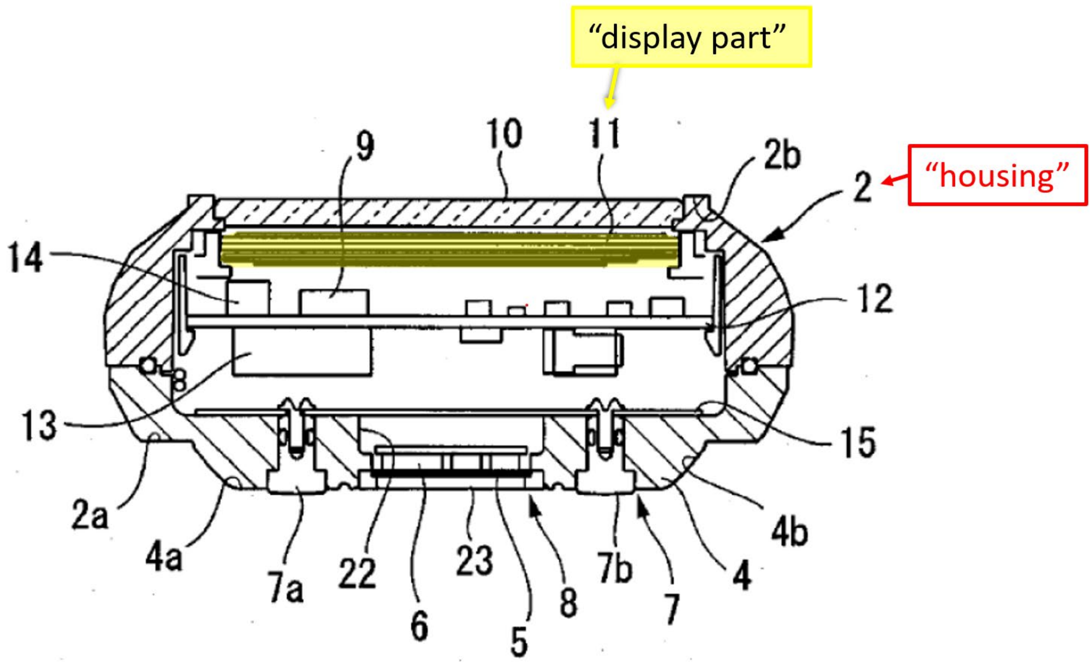
Kotanagi's watch has "a display part 11 for displaying . . . pulse rate that is detected and various other information is disposed inside the cover glass 10." EX1005 ¶48.



See id. at 25, 27 (Figs. 4, 7). EX1003 ¶162.

c. [10c] "a housing at least partially enclosing the display;"

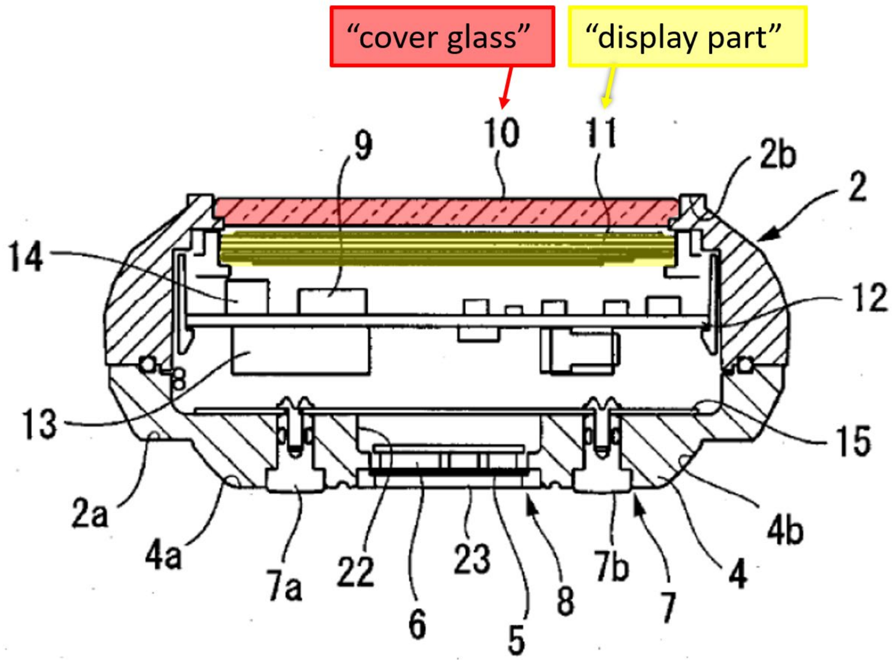
Kotanagi's cover glass 10 is "fitted into the central portion of the upper surface 2b of the housing 2," and the display part 11 is "disposed inside the cover glass 10." EX1005 ¶48. Thus, the housing at least partially encloses the display:



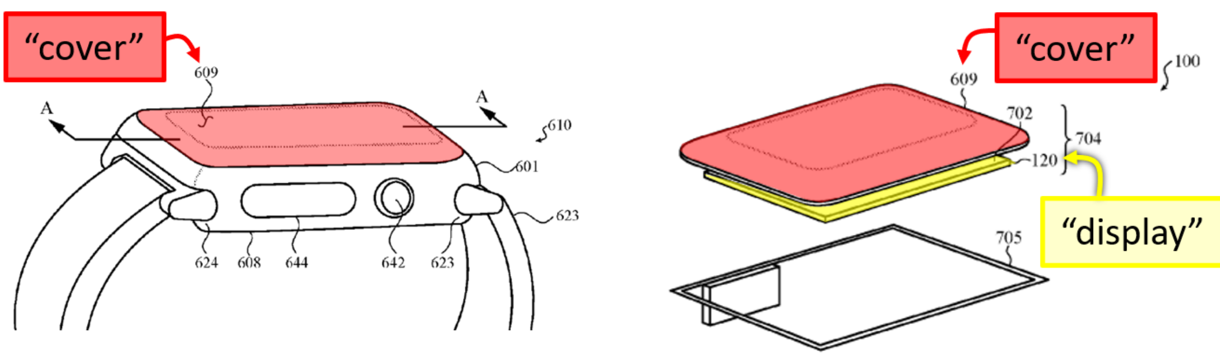
See EX1005 at 27 (Fig. 7). EX1003 ¶163.

d. [10d] "a front cover positioned over the display and defining at least a portion of a front exterior surface of the electronic watch;"

Kotanagi's "cover glass 10" is part of the front exterior surface:



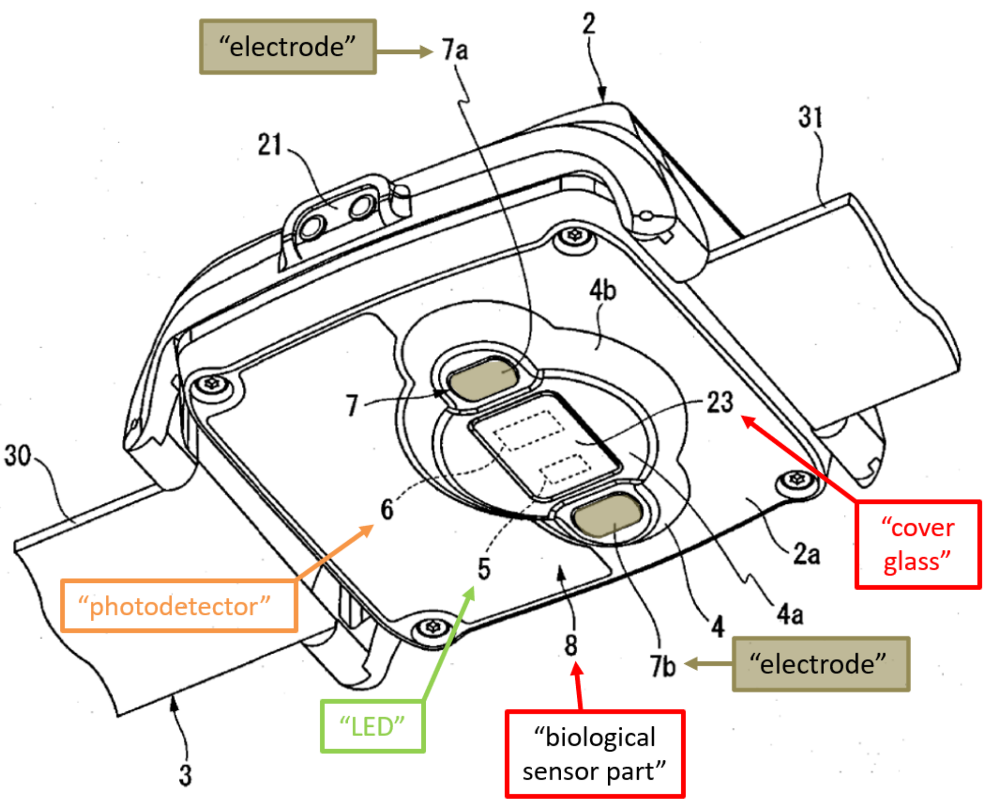
See EX1005 at 27 (Fig. 7). The cover glass 10 is positioned "over" the display 11 in Kotanagi's figure above. This is consistent with the '483 patent's display, which is also under a cover glass in the opening:



See EX1001 at 13–14 (Figs. 6, 7). Accordingly, Kotanagi teaches this limitation. EX1003 ¶¶164–165.

e. [10e] "a biosensor module defining at least a portion of a rear exterior surface of the electronic watch opposite the front exterior surface, the biosensor module comprising:"

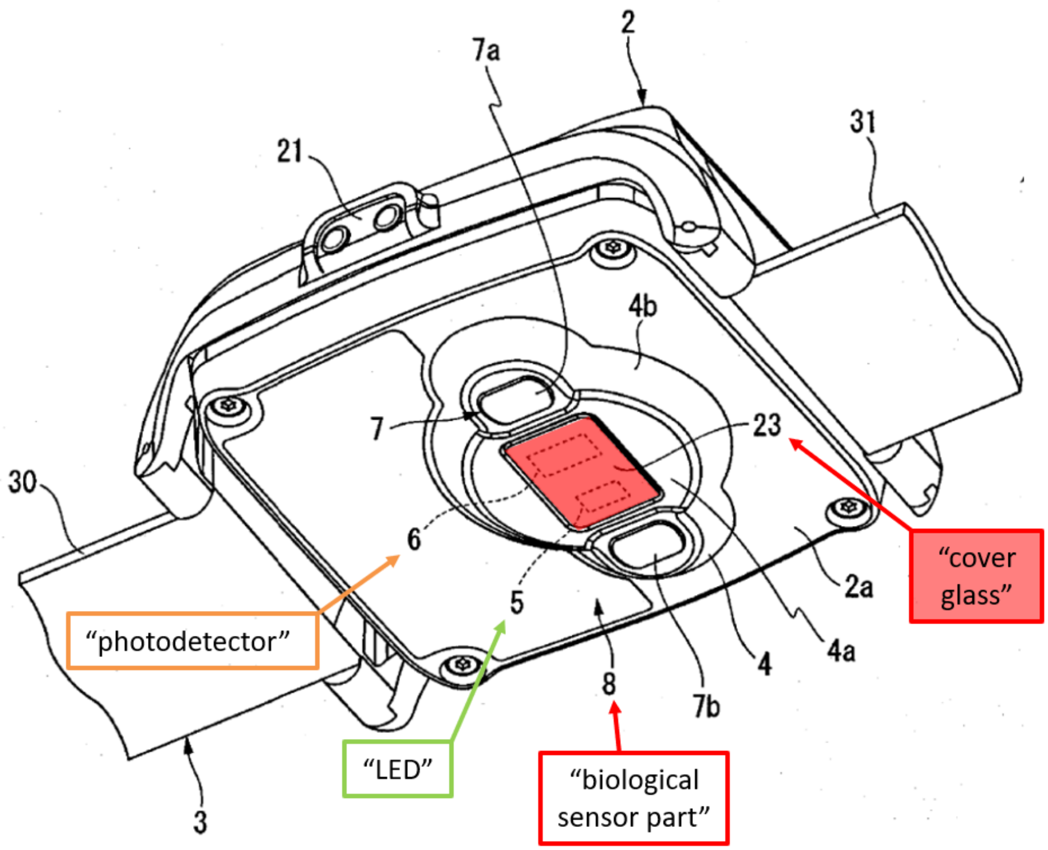
Claim limitations **[10e]**–**[10i]** specify that the '483 biosensor module comprises a rear cover, an optical sensor, and electrodes. Kotanagi's biological sensor includes a rear cover glass 23, optical components (photodetector 6 and LED 5), and electrodes 7a and 7b. This biosensor module is located on, and helps define, the rear exterior surface of Kotanagi's device:



EX1005 at 26 (Fig. 5). EX1003 ¶166.

f. [10f] "a rear cover defining an optically transparent window;"

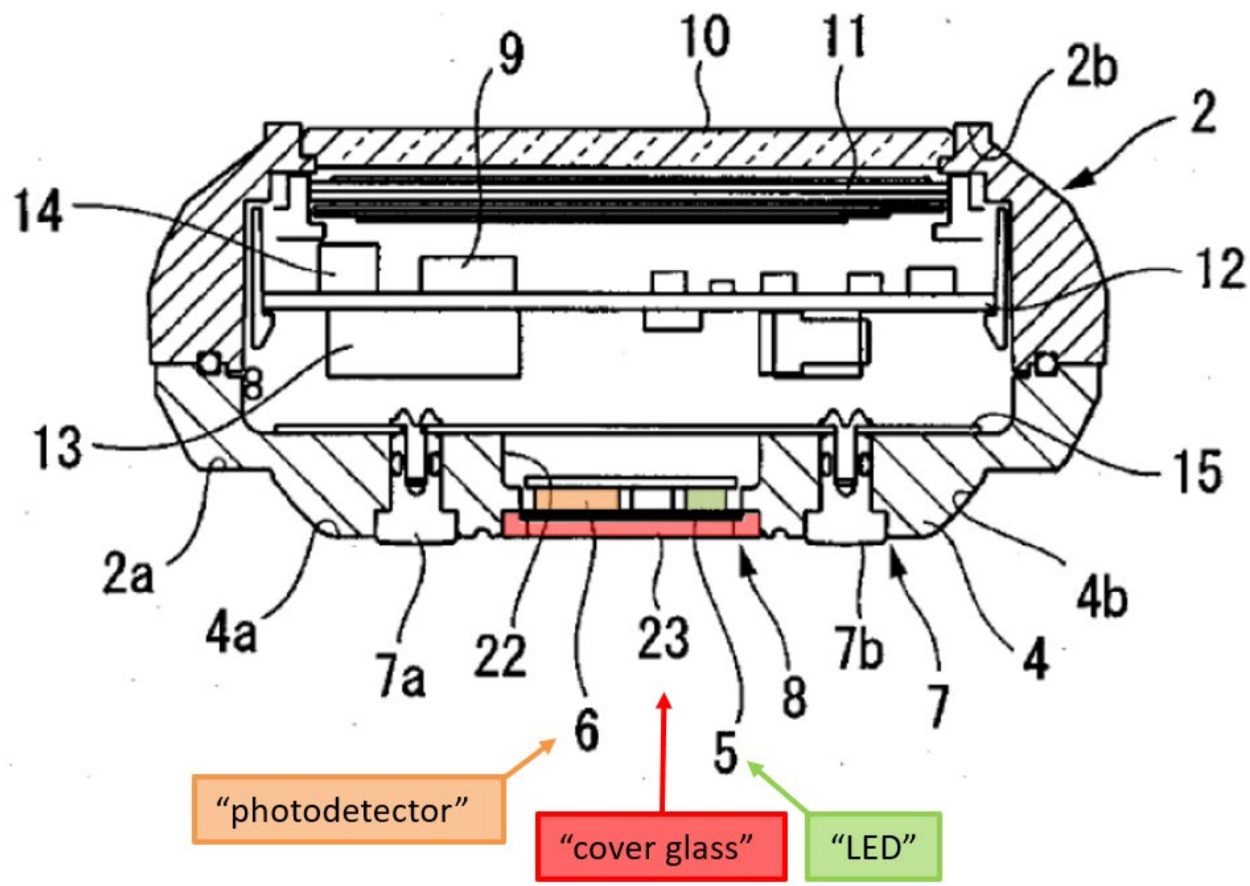
Consistent with the construction in § I(F)(1) above, Kotanagi teaches a rear "glass cover 23" that operates as an optically transparent window for the biological sensor: "LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." EX1005 ¶55. The cover is optically transparent because the LED emits light through it and "PD 6 can receive reflected light corresponding to the pulsation of arteries." *Id.* ¶65.



See id. at 26 (Fig. 5). EX1003 ¶167.

g. [10g] "an optical sensor positioned below the optically transparent window;"

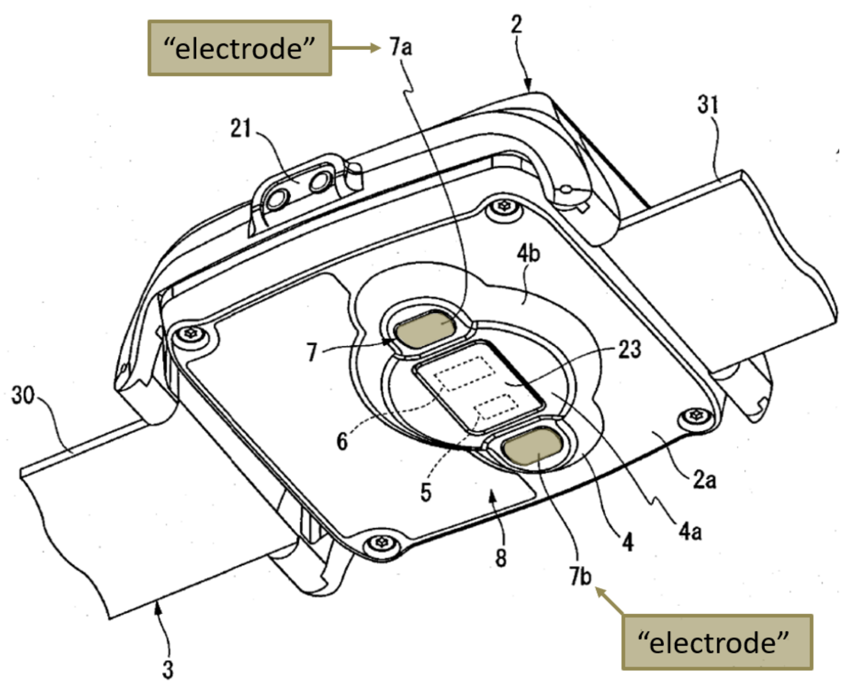
As noted for limitation **[10f]**, Kotanagi's "LED 5 and the PD 6 are disposed adjacent to one another . . . so as to touch the inside of the glass cover 23." EX1005 ¶55. Thus, the LED and PD are positioned "below" the cover glass 23.



See EX1005 at 27 (Fig. 7). EX1003 ¶168.

h. [10h] "a first electrode positioned along the rear exterior surface of the electronic watch; and a second electrode positioned along the rear exterior surface of the electronic watch; and"

Kotanagi teaches a pair of rear surface electrodes. EX1005 ¶¶59, 86.



See id. at 26 (Fig. 5). EX1003 ¶169.

i. [10i] "a third electrode positioned along a side of the electronic watch, wherein:"

As noted for limitation **[1j]**, the combination of Kotanagi and Coppola teaches a third electrode positioned along a side of the biosensing watch. EX1003 ¶¶170–177.

j. [10j] "the electronic watch is configured to measure a first physiological parameter of a wearer using the optical sensor; and"

As noted for limitation **[1k]**, Kotanagi teaches measuring a first physiological parameter (e.g., pulse rate), with its optical sensor. EX1003 ¶¶178–179.

k. [10k] "the electronic watch is configured to measure a second physiological parameter using the first electrode, the second electrode, and the third electrode."

As shown for limitations **[1l]**, **[2c]** and **[2d]**, Kotanagi in view of Coppola teaches the measurement of an ECG with a first, second and third electrode. *See also supra* note 8 (Many watches have used three or more electrodes for ECG measurement). EX1003 ¶¶180–185.

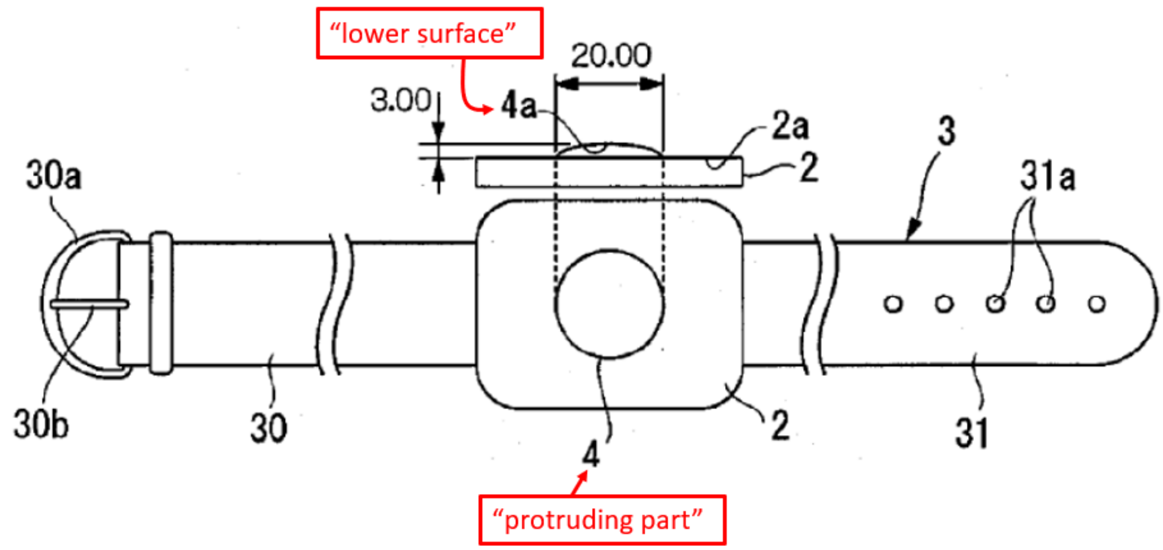
l. Motivation to Combine Kotanagi and Coppola

A POSITA would have been motivated to combine the teachings of Kotanagi and Coppola at least for the reasons in § IV(A)(1)(m). Further motivations to combine are provided throughout this petition. EX1003 ¶186.

6. Dependent Claim 11

Claim 11 depends from Claim 10 and adds **"wherein the rear cover defines a convex exterior surface."**

As noted for limitation **[1g]**, Kotanagi teaches the cover can form or comprise part of a convex protrusion: "Further, a curved surface may be formed from the center toward the outer edge of the lower surface 4a of the protruding part 4, as illustrated in FIG. 10." EX1005 ¶80.

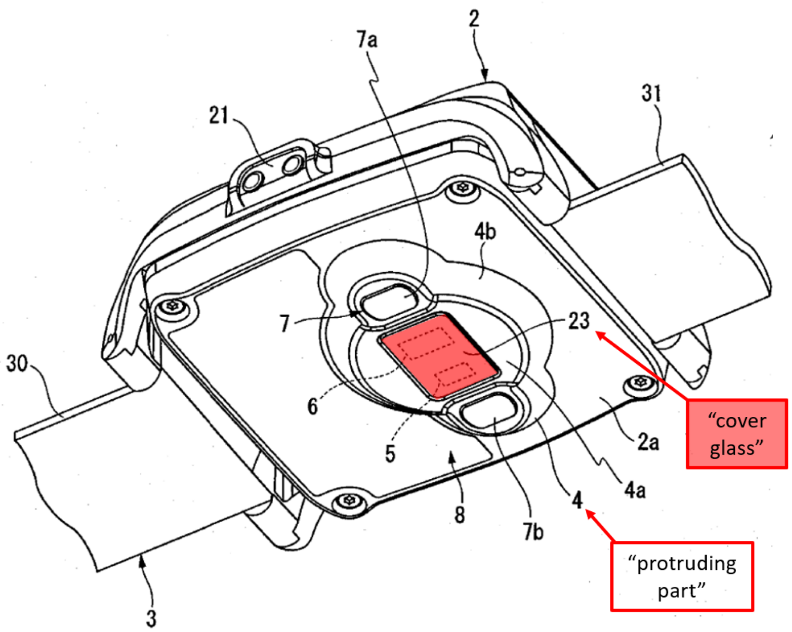


See EX1005 at 28 (Fig. 10). A POSITA would have understood from Kotanagi's Figure 10 that the protruding part can form a convex "cover glass" that spans the through-hole 22. *Id.* at 28. Kotanagi states that its protruding part causes the body to "deform[] smoothly," which "enhances the adherence." EX1005 ¶¶35, 80. EX1003 ¶¶187–189.

7. Dependent Claim 12

Claim 12 depends from Claim 10 and adds **"wherein the optically transparent window is located within a portion of the rear cover that defines the convex exterior surface."**

As discussed and illustrated above with regard to Claim 11, Kotanagi teaches a convex exterior surface. A POSITA would have understood from Figure 10 that the "protruding part 4" of Figure 10 is formed from Kotanagi's cover glass 23. In a different embodiment, Kotanagi shows a window in protruding part 4:



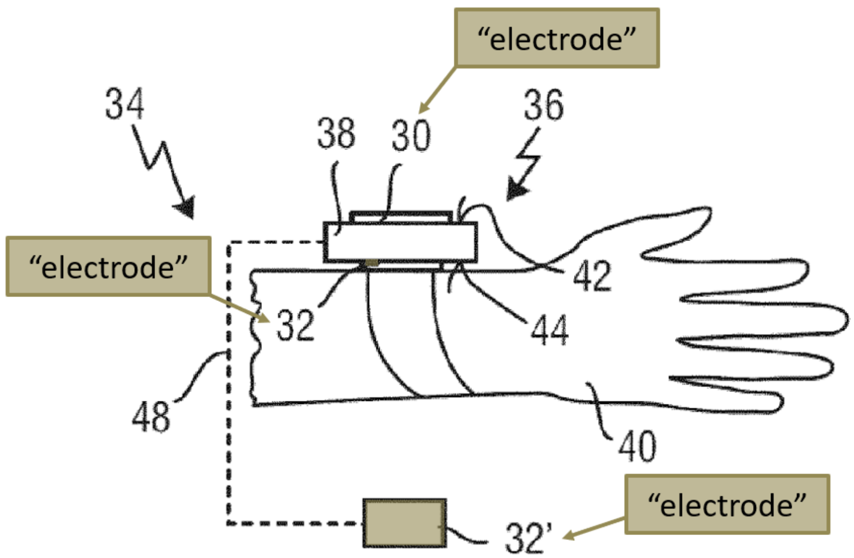
See EX1005 at 26 (Fig. 5). Moreover, Kotanagi teaches that the "biological sensor part" (which includes cover glass 23) "is disposed on a lower surface of the protruding part." EX1005 ¶7. As Kotanagi's Figure 10 illustrates, this "lower surface" can be convex. Thus, Kotanagi teaches these limitations. EX1003 ¶¶190–192.

8. Dependent Claim 13

Claim 13 depends from Claim 10 and adds **"wherein the first electrode, the second electrode, and the third electrode are part of an electrocardiograph**

sensing system."

As discussed for limitations **[10i]–[10k]** (referencing **[1j]–[1l]**, **[2c]–[2d]**), Kotanagi in view of Coppola teaches an ECG measurement with a first, second, and third electrode.



See EX1009 at 28; EX1020 at 25 (Fig. 3). *See* EX1009 8:23–25; EX1020 6:13–15 ("electrocardiography ECG unit comprising at least a first and a second electrode.") Thus, the electrodes would all be part of the claimed electrocardiograph sensing system. EX1003 ¶194.

Consistent with discussion of limitations **[1j]**–**[1l]**, **[2c]**–**[2d]**, and the motivations provided in § IV(A)(1)(m), a POSITA would have combined Kotanagi and Coppola to use three electrodes for ECG measurement, not only based on the teachings of Kotanagi and Coppola—e.g., to gain "deep insights into the cardiac

cycle" EX1009 8:26–27; EX1020 6:16–17—but also to provide multi-functionality, reliability (e.g., through redundancy), improved signal strength, and an ergonomic design (a side electrode is convenient to touch). EX1003 ¶195.

9. Dependent Claim 14

Claim 14 depends from Claim 10 and adds "**wherein the first physiological parameter is a heart rate**."

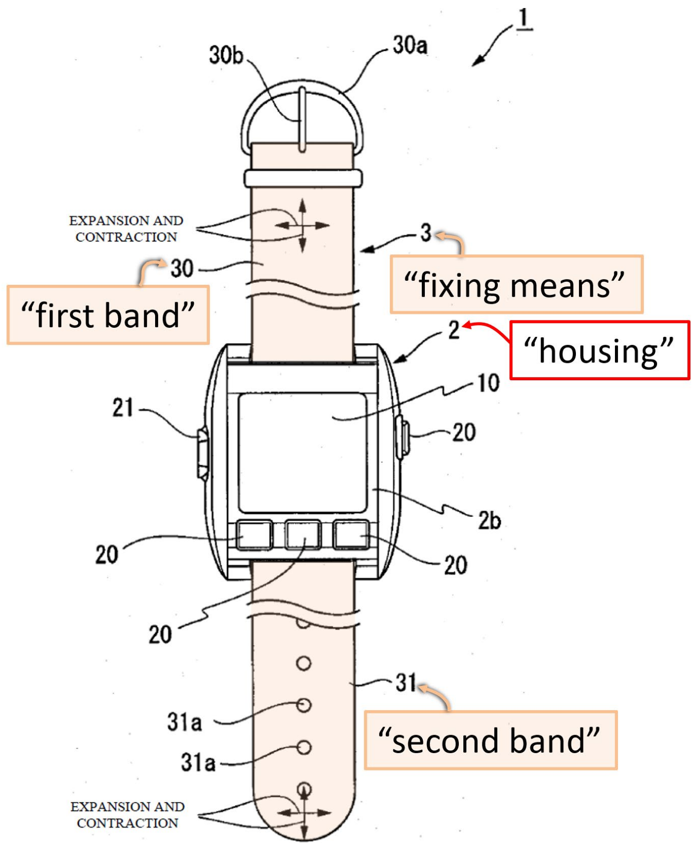
As noted for limitations **[1k]** and **[10j]** Kotanagi teaches measuring a first physiological parameter with its optical sensor, as light is emitted from the LED 5, partially absorbed by hemoglobin in blood vessels, and partially reflected back to the PD 6, which "generates a pulse signal." EX1005 ¶65. Data processing part 9 converts the pulse signal into a "pulse rate." *Id.* ¶66. A POSITA would have known that pulse rate is the same as heart rate in this context, as pulsing fluctuations in blood flow result from and are a manifestation of heart contractions. EX1003 ¶¶196–197.

10. Independent Claim 16

a. [16a] "A wearable electronic device comprising: a housing; a band attached to the housing and configured to couple the wearable electronic device to a user;"

Kotanagi describes a "biological information measuring device 1 [that] includes a housing (main body) 2 . . . and a fixing means 3 for mounting the

housing 2 to the wrist." EX1005 ¶45. "The fixing means 3 has a first band 30 and a second band 31 having base end sides that are attached to the housing 2 to enable mounting to the wrist." (*id.* ¶60).



See id. at 23 (Fig. 1). EX1003 ¶198.

b. [16b] "a touch-sensitive display positioned at least partially within the housing;"

Kotanagi teaches a "liquid crystal display device" that may display information based on "input from each button 20." EX1005 ¶¶50–51.

In the same field of endeavor, Coppola teaches that its wristwatch-like device 36 has "a graphic user interface (GUI) element 46, which enables an